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Volume 29 Number 9

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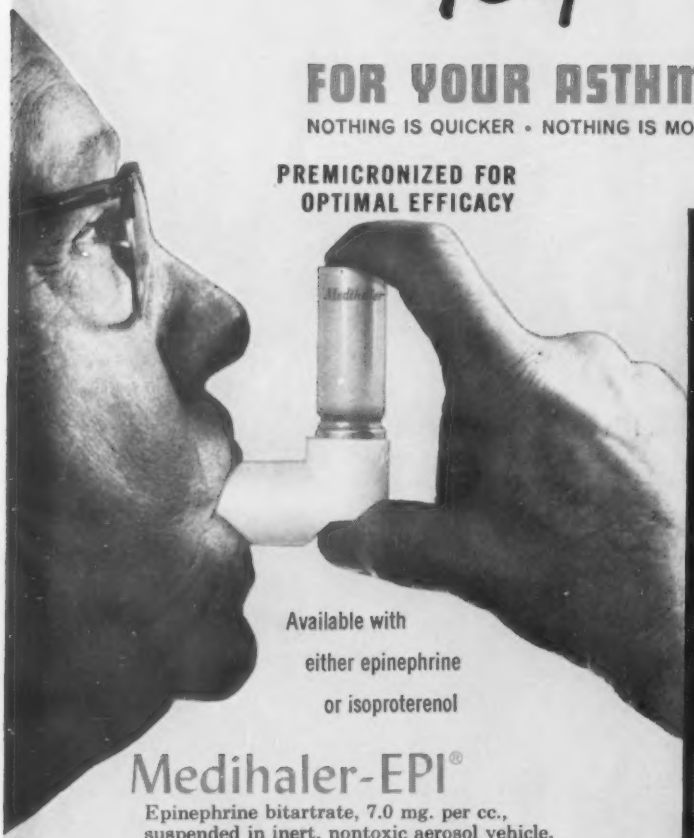

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1. Fullgrabe, E. A.: Ann. New York Acad. Sc. 68:192, 1957. 2. Jenkins, B. H.: J.M.A. Georgia 45:431, 1956. 3. Davis, O. F., et al.: Postgrad. Med. 26:719, 1959.

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INDUSTRIAL MEDICINE and SURGERY

ESTABLISHED 1932

The International Journal of Medicine in Industry

SEPTEMBER, 1960
VOLUME XXIX
NUMBER 9

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PERSONAL NEWS AND NOTES

The Granite City Steel Company, Granite City, Ill., has announced the appointment of RICHARD E. WALTERS, M.D., as its first full-time Medical Director.

DR. WALTERS succeeds WILLIS W. BOWERS, M.D., of Granite City, who served as part-time Medical Director of the steel company.

A native of Wichita, Kans., DR. WALTERS comes to Granite City Steel from the Cummins Engine Company of Columbus, Ind., where he also served as Medical Director. He received his BA degree from the University of Wichita and his MD degree from the University of Kansas (1951). He was a flight surgeon in the U. S. Air Force at Waco, Texas, from January, 1953, to July, 1955. He then was a resident in surgery at the Cincinnati (O.) College of Medicine and Christ Hospital until joining Cummins Company in November, 1956.

Among his postgraduate work, DR. WALTERS studied "Eyes in Industry" and "Occupational Skin Disease" at the Kettering Laboratory of the University of Cincinnati. He also studied "Psychiatry and Occupational Health" at the Menninger Foundation.

At Granite City Steel, he will administer the entire medical department with emphasis on a preventive medicine program. He will also participate in the American Iron and Steel Institute's Committee on Industrial Medicine.

Miles O. Colwell, M.D.

MILES O. COLWELL, M.D., has been appointed Medical Director for Aluminum Company of America, succeeding DUDLEY A. IRWIN, M.D., who has retired after 17 years of service.

DR. COLWELL, a specialist in internal medicine, has been Alcoa's Assistant Medical Director for the past year. He previously was engaged in private practice. DR. COLWELL received his degree in medicine from the University of Pennsylvania in 1943. He interned at Presbyterian Hospital, Philadelphia; served as an Army battalion surgeon during World War II; and was awarded the combat medical badge, Bronze Star, and Silver Star. He returned to Presbyterian Hospital for his residency in 1946, and was certified by the American Board of Internal Medicine in 1952.

DR. IRWIN, who organized Alcoa's medical and industrial hygiene program in 1943, received his medical degree from the University of Toronto in 1926. He later served in the university's department of medical research as a research fellow, and as assistant to SIR FREDERICK BANTING, discoverer of insulin. DR. IRWIN has been acclaimed for his research on the use of aluminum powder in the prevention and treatment of silicosis.

DANIEL J. FELDMAN, M.D., has been appointed Director of the Rehabilitation Services and Associate Professor of Medicine at Stanford University School of Medicine. He is now Associate Professor at New York University School of Medicine in the Institute of Physical Medicine.

DR. FELDMAN was trained in internal medicine and physical medicine and is board accredited in both specialties. A graduate of Columbia University in liberal arts, he earned an M.D. degree in 1938 from New York University School of Medicine. He will replace RODNEY R. BEARD, M.D., as Director of the Rehabilitation Services. DR. BEARD, who has directed the Services since 1955, will continue as Professor and Executive of the Department of Preventive Medicine.

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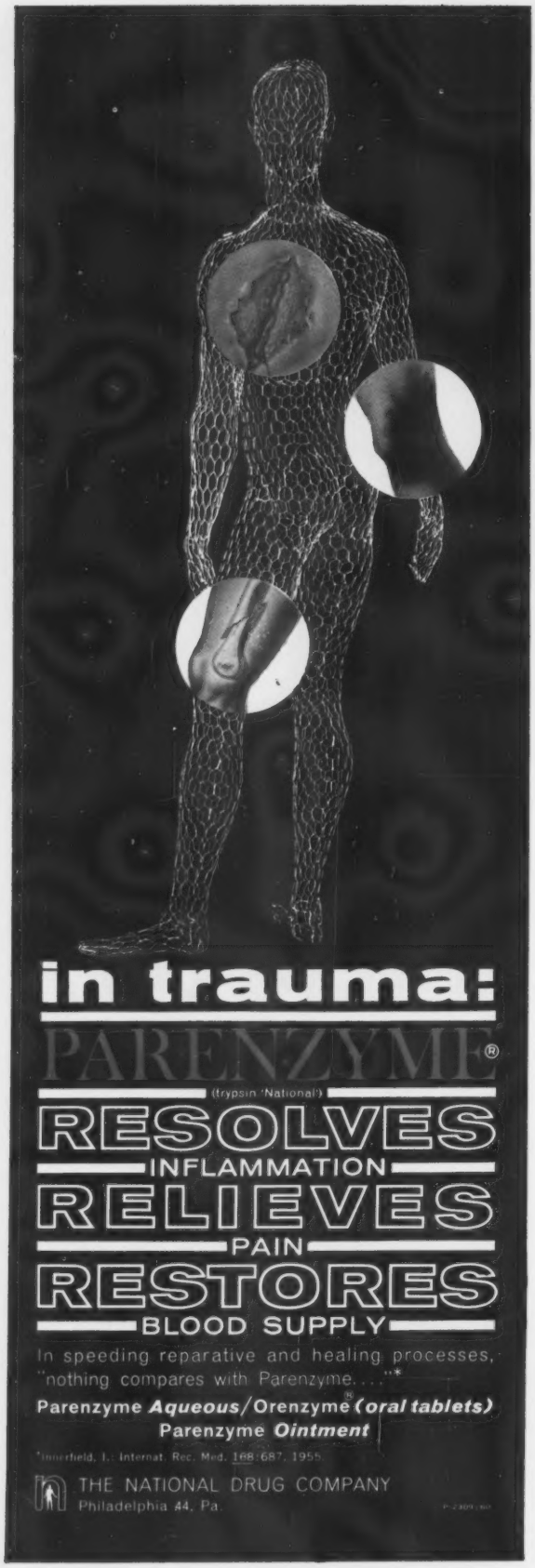

Edwin A. McGovern, M.D.

EDWIN A. McGOVERN, M.D., has been appointed Works Physician at the Pittsburgh Works of Jones & Laughlin Steel Corporation, it was announced today by WALTER H. LEWIS, Pittsburgh Works Manager. DR. McGOVERN, who has been Works Physician at J&L's Cleveland Works since 1953, succeeds ROBERT J. HALEN, M.D., who earlier was named J&L's Medical Director.

DR. McGOVERN was graduated from Jefferson Medical College, Philadelphia, in 1946, and served in the U. S. Medical Corps from 1947 to 1949. He also earned a Master of Public Health Degree at the University of Pittsburgh's School of Public Health in 1952. Prior to his J&L service, he was a resident physician in internal medicine at the Veterans Administration Hospital at Aspinwall, Pa., and plant physician at the General Motors Cadillac Tank plant in Cleveland.

Joseph E. Seagram & Sons, Inc. has announced the appointment of J. ALLEN YAGER, M.D., Fellow of the American College of Cardiology and medical administrator, as Medical Director of the company.

DR. YAGER will leave his practice of internal medicine to join Seagram. He is currently President of the Medical Board of Barnert Memorial Hospital in Paterson, N. J. and a member of the Passaic County Air Pollution Control Association. He also serves as a member of the Board of Directors of Group Health Insurance, a nonprofit medical service agency; and as a member of the American Medical Association's Cardiology Committee on Medical Rating of Physical Impairment.

In the past, DR. YAGER has served as President of the Passaic County Medical Society, the Passaic County Heart Association and the Passaic County Health Council.

J. Allan Yager, M.D.

A native of New York City, DR. YAGER received his medical degree in 1927 from N.Y.U., and the degree of Master of Public Health in 1952 from the Columbia University School of Public Health and Administrative Medicine.

Following his early medical training, DR. YAGER was a member of the teaching staff of the New York University College of Medicine, completed a research fellowship at Bellevue Hospital, New York, and engaged in postgraduate studies in Vienna, Austria. During World War II, he served as a Lt. Commander of the U. S. Navy Medical Corps.

Community Service Award from the Federation of the Handicapped in New York was awarded recently to Bulova Watch Company, Inc. Accepting plaque from Federation Executive Director MILTON COHEN (left) is BENJAMIN H. LIPTON, Director of the Joseph Bulova School of Watchmaking, which has trained some 625 paraplegics and other handicapped men in the past 15 years.

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References: 1. Golden, H. T.: Delaware M. J. 26:267, 1954. 2. Silbert, N. E. Geriatrics 14:562 (Sept.) 1959

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the work the company has done "since the end of World War II in the training of the disabled to become watchmakers and electronic technicians."

JOHN MACIVER, M.D., has been appointed Assistant Medical Director, United States Steel Corporation, it was announced by ROBERT B. O'CONNOR, M.D., Medical Director for United States Steel. DR. MACIVER assumed his duties on August 1 in the Pittsburgh offices of U. S. Steel.

For three years, DR. MACIVER was in the Safety and Occupational Health Bureau in the Medical Department of Metropolitan Life Insurance Company, the last year as Director of the Bureau. He has spent the past two years as full-time psychiatrist in the Medical Department of The America Fore Loyalty Group, New York City. DR. MACIVER obtained an M.D. degree from Columbia University, the degree of Master of Public Health from Yale, and subsequently completed his psychiatric training at Yale. This was followed by a year of postgraduate study at the Psychoanalytic Institute at Columbia.

DR. MACIVER is a Diplomate of the American Board of Preventive Medicine. He is a member of the Industrial Medical Association, the American Psychiatric Association, and the American Public Health Association.

The Division of Scientific Publications of the American Medical Association announces the passing of the publication entitled *A.M.A. Archives of Industrial Health* in this language: "At the meeting of the Board of Trustees of the American Medical Association on April 8, 1960, the title of the *A.M.A. Archives of Industrial Health* was changed to *Archives of Environmental Health*. Two significant features were embodied in the action. The deletion of 'A.M.A.' from the title from each of the 10 Specialty Journals published by the American Medical Association was sanctioned by the Board of Trustees earlier in the year. It was agreed that such identification served no useful purpose and constituted an unwieldly caption. This action will become effective on July 1, 1960. The more radical maneuver — revision of the basic concept of the mission of the *Archives of Industrial Health* — has been under consideration for several months. A number of suggestions for a better name were reviewed and rejected, except for *Archives of Environmental Health*. Recognition of a wider horizon should be evident by the new title and the three following subtitles. The addition of Preventive Medicine, Industrial Health, and Aerospace Medicine serves to implement the program. These titles will identify the specific areas of interest for the Archives, maintaining, meanwhile, the badge of affiliation with the American Academy of Occupational Medicine."

Volume 1, Number 1 of this new publication (July, 1960) is exclusively devoted to occupational health. It may be presumed that this dominance by occupational health items will continue until the portfolio of accumulated manuscripts for the older publications will have been exhausted. The masthead for the new publication indicates the retention at least for the time being the same editorial board, the members of which are all identified with occupational health. The presumption is that this editorial board will be modified with the development of the broader coverage indicated.

Died

JAMES T(homas) CASE, M.D., F.A.C.S., 78, surgeon, internationally distinguished roentgenologist, teacher, author, editor, on May 24, 1960, at Santa Barbara, Cal., where he was Director, Memorial Cancer Foundation. DR. CASE was born in San Antonio, Texas, in January, 1882; received his M.D. degree at American Missionary Medical College (University of Illinois College of Medicine), 1905; interned at Battle Creek Sanitarium; studied postgraduate, in Vienna, Paris, St. Petersburg, Berlin, London, Hamburg, Frankfort, Lyons, 1902-25; D.M.R.E., University of Cambridge, 1920. In 1917-18 he was Senior Consultant in Surgery and in general charge of x-ray service AEF, France. As consulting surgeon and radiologist for many insurance and industrial companies, his expertness in diagnosis had much to do with ending the "silicosis racket" in the 1930's. He was Editor, *Annals of Roentgenology*, 16 vols., 1920-34; Associate Editor, *Industrial Medicine & Surgery*, 1936-58; Editor, *American Journal of Roentgenology;* author. *X-Ray Examination of the Alimentary Tract*, 4 vols., 1914, Spanish edition, 1918, second edition, 1922; and of chapters in numerous textbooks, and of several hundred medical and surgical articles. At Northwestern University Medical School he was Professor of Radiology and Head of Department, 1912-47, Professor Emeritus, 1947; and for many years he was Director, X-Ray Department, St. Lukes Hospital, Chicago, and Evanston (Ill.) Hospital, and Radiologist, Passavant Hospital, Chicago, and Marine Hospital and Highland Park Hospital, Highland Park, Ill. His professional Fellowships included AMA, ACS, Royal Society of Medicine, England; and he was a member, American Roentgen Ray Society (President, 1919-20), American Radium Society (President, 1923-24), American College of Radiology (President, 1929-30), Western Surgical Association, Chicago Roentgen Society, Interamerican Congress of Radiology (President, 1955); and honorary member of roentgen and radiological professional societies of America, France, Spain, Brazil, Peru, and other countries. He was a delegate to and sometimes an officer of several international professional congresses. Among the decorations he received were Order of the Purple Heart (U.S.); Order of Merito Militar (Mexico), 1948; Cuban Order of Merit, Carlos Finlay, 1955; Columbian Orden de Boyaca, 1955; gold medal, Interamerican Congress of Radiology, 1955. He was Honorary Professor of Radiology, University of San Marcos, Lima, Peru, 1949. By the many whose privilege it was to be associated with him he will be remembered as wise counselor and loyal friend.

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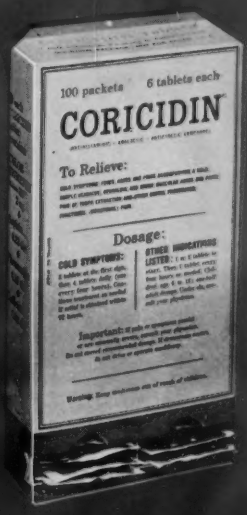

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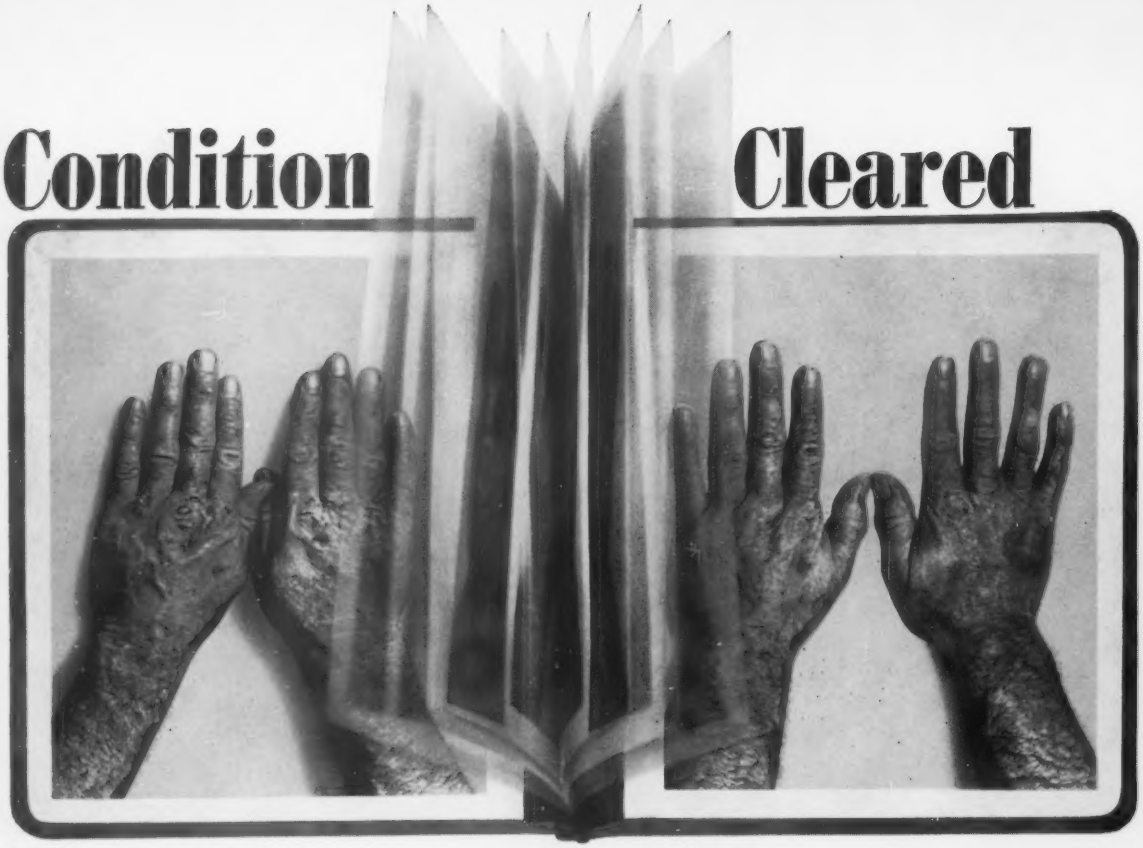

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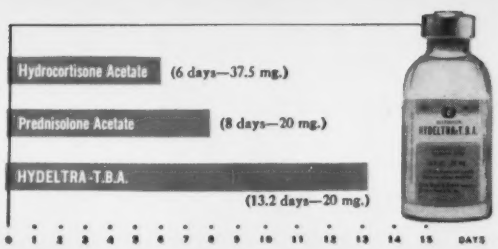
Anti-inflammatory effect lasts longer than that provided by any other steroid ester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1. Kelly, J. J., Jr.: Am. J. Med. Sci. *232*:119-128 (Aug.) 1956.

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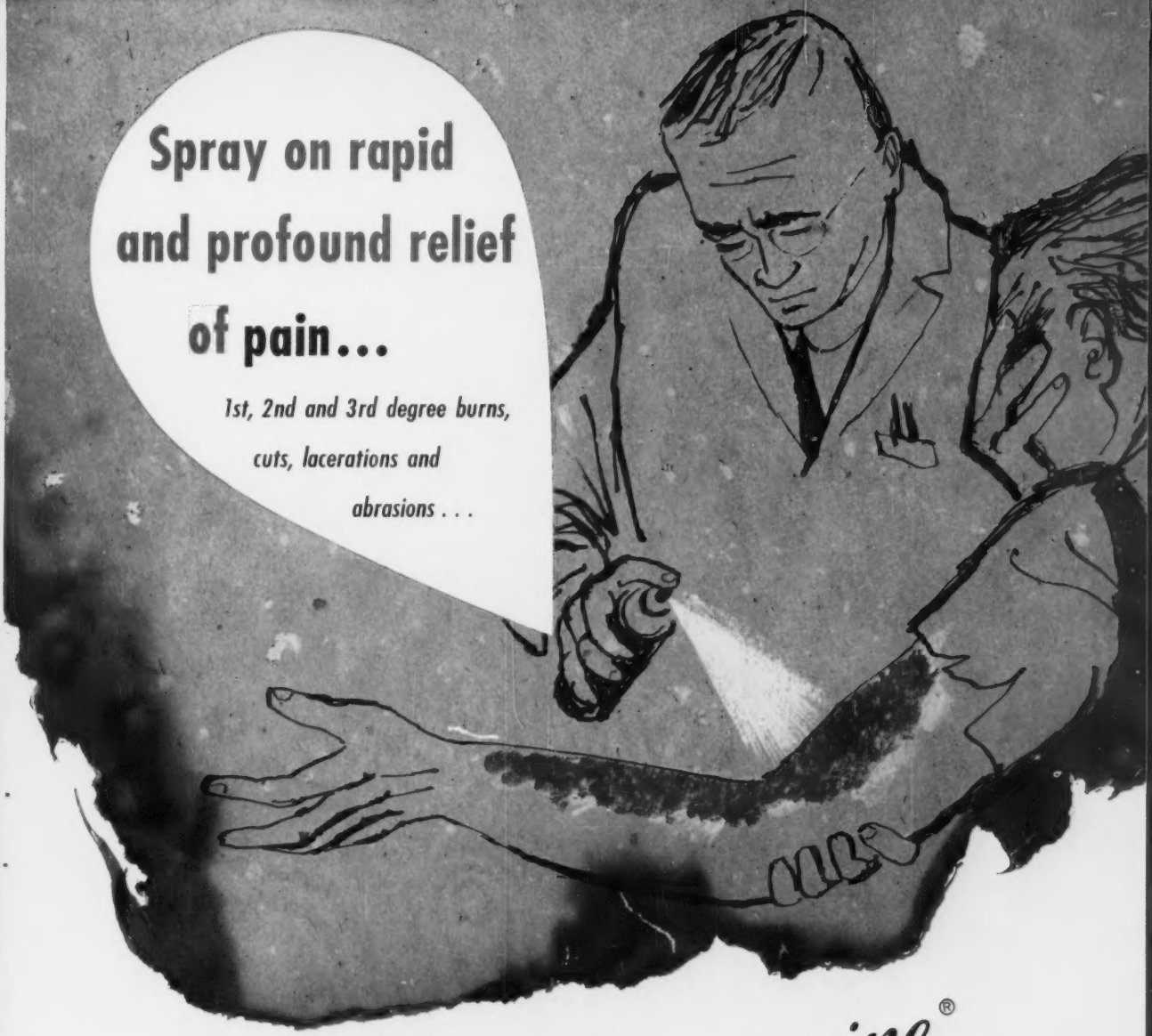

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1. Kuba, E. F.: First Stage Treatment of Burns and Prevention of Shock, Indust. Med. 12:369-371 (Aug.) 1958.

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- An analgesic component—aspirin—whose pain-relieving effect is markedly enhanced by Robaxin, and which has added value as an anti-inflammatory and anti-rheumatic agent. . . . (5 gr.) 325 mg.

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SUPPLY: ROBAXISAL Tablets (pink-and-white, laminated) in bottles of 100 and 500.
Also available: ROBAXIN Injectable, 1.0 Gm. in 10-cc ampul. ROBAXIN Tablets, 0.5 Gm. (white, scored) in bottles of 50 and 500.

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EASY-ENTRY POINTS
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FULL-PROTECTION SHEATHS
in the package—after filling—
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anticholinergic

KEEPS THE STOMACH FREE OF PAIN

tranquilizer

KEEPS THE MIND OFF THE STOMACH

Milpath acts quickly to suppress hypermotility, hypersecretion, pain and spasm, and to allay anxiety and tension with minimal side effects.

AVAILABLE IN TWO POTENCIES:

Milpath-400 – Yellow, scored tablets of 400 mg. Miltown (meprobamate) and 25 mg. tridihexethyl chloride. Bottle of 50.

Dosage: 1 tablet t.i.d. at mealtime and 2 at bedtime.

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®Miltown + *anticholinergic*

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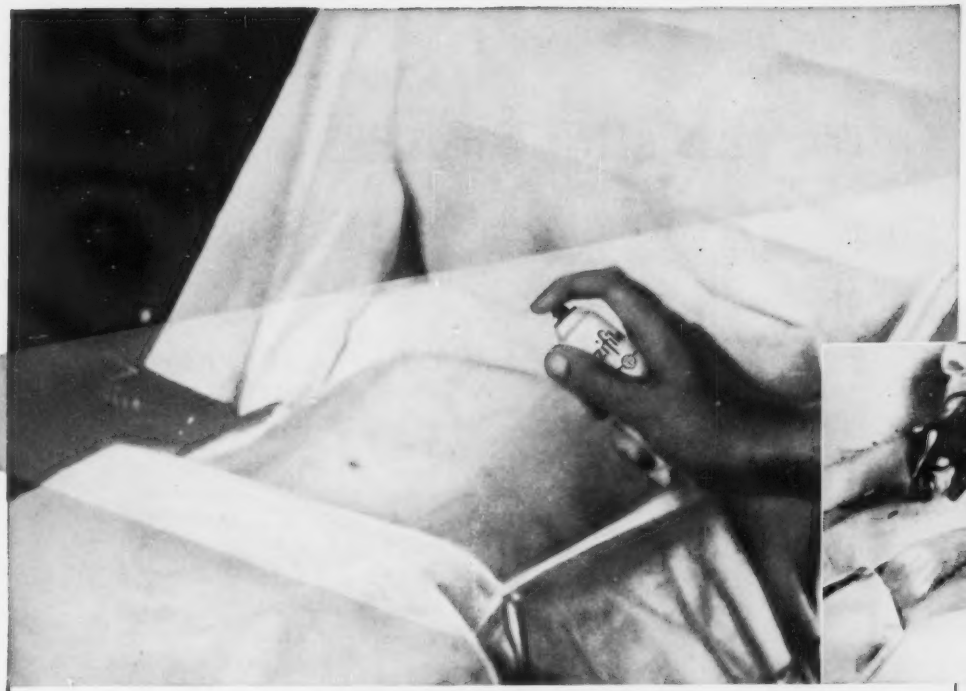
REZIFILM is a methacrylate resin. On the skin, it forms a clear, firm, flexible barrier against airborne microorganisms. This physical protection is supplemented by the antibacterial activity of TMTD (tetramethylthiuram disulfide), readily diffusible from the plastic film to the skin beneath. TMTD, which is neither an antibiotic nor a sulfonamide, is highly active against a wide range of pathogenic bacteria, including many organisms resistant to the most commonly used antibiotics.[1]

Advantages:

• incision can be made directly through film,[2] minimizing or eliminating need for skin towels • does not impede healing[3] • no sensitization reactions reported • does not interfere with joint movement • more comfortable than adhesive bandages • protects against clothing irritation[4] • protects skin around enterostomy and fistula openings[5]

REZIFILM is *not* indicated as a dressing for second or third degree burns or for bleeding or granulating wounds.



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Rezifilm is applied after prepping of the surgical area. It functions as a secondary drape.

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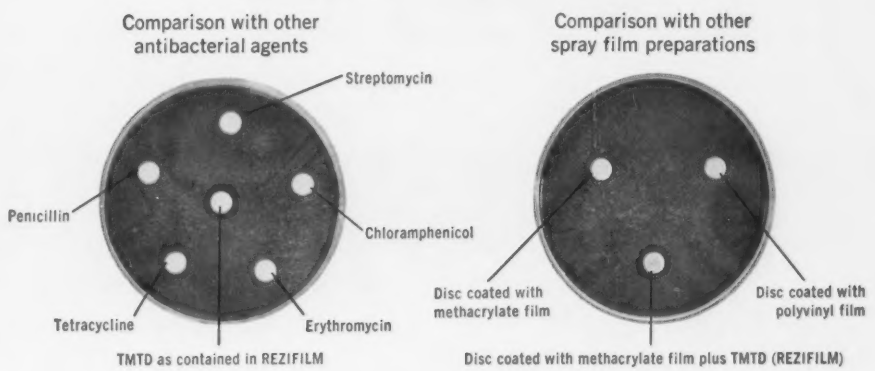
Rezifilm is applied following final closure of the incision. It provides comfortable protection against infection and irritation.

Compare the antibacterial activity of REZIFILM[6]



Streaked cultures of coagulase-positive Staphylococcus aureus, phage type 80/81; incubated 24 hours at 37°C.

An interesting 15 mm. color motion picture film (10 minutes) showing the use of REZIFILM *in surgery is available free of charge. Excellent for hospital and medical society meetings. Write to: Professional Service Department, Squibb, 745 Fifth Avenue, New York 22, N. Y.*

Supplied: 6 oz. (avd.) spray dispenser cans.

References: 1. Eisenberg, G. M.: *Antibiotic Med. & Clin. Ther.*, 6:594 (Oct.) 1959. 2. Thomson, J. E. M.: Report to The Squibb Institute for Medical Research, June, 1957. 3. Maloney, J. V. and Mulder, D. G.: *Am. Surgeon* 23:388 (April) 1957. 4. Bucher, R. M.: Report to The Squibb Institute for Medical Research, July 3, 1957. 5. Hammond, J. A.: Report to The Squibb Institute for Medical Research, May 3, 1957. 6. Eisenberg, G. M.; Weiss, W.; Spivack, A. P.; Bassett, J. G.; Ferguson, L. K., and Flippin, H. F.: Adapted from Scientific Exhibit, A.M.A. Meeting, June 8-12, 1959.

- *provides skin asepsis, both preoperatively and postoperatively*
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- *wound always in sight through window-clear film*
- *more convenient and more economical than ordinary dressings*

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transparent plastic barrier with antibacterial action

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*the unmentioned edema, mood changes, GI distress, preceding menstruation

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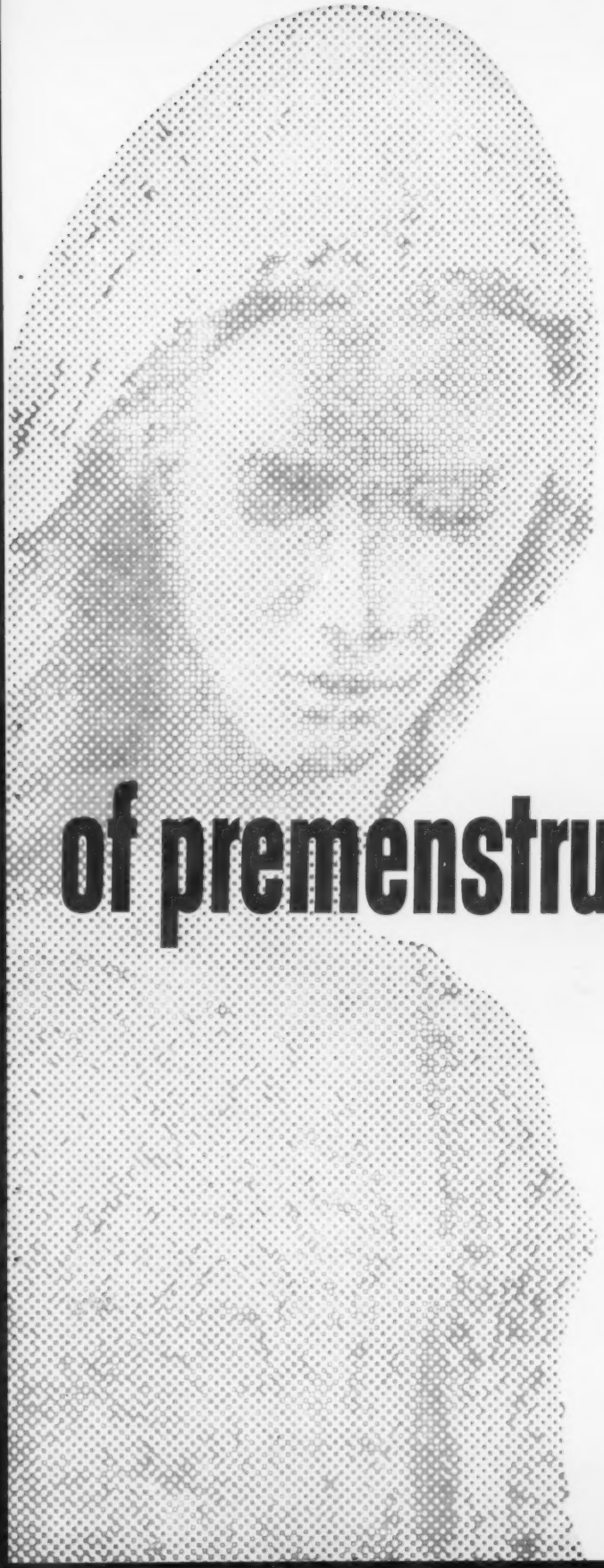
CYCLEX supplies the effective relief of meprobamate for nervousness, irritability, tension, nausea, malaise, insomnia

for GI DISTRESS...
CYCLEX affords quick-acting relief of nausea and bloating associated with premenstrual tension.



INDICATION: **CYCLEX** is indicated for the relief of premenstrual tension with edema.

USUAL DOSAGE:
One CYCLEX Tablet 1 or 2 times daily, beginning when symptoms appear and continuing until the onset of menses.

# of premenstrual tension

SUPPLIED: **CYCLEX** Tablets are supplied in bottles of 100. Each tablet contains 25 mg. of hydrochlorothiazide and 200 mg. of meprobamate.

Additional information on CYCLEX is available to physicians on request.

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condition	no. of cases	excellent/good	fair	no response
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fractures, sprains & strains	64	44	14	6
TOTAL	228	181	33	14

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1. Billow, B. W., *et al.*: Southwestern Med. *41*:286, (May) 1960.
2. Teitel, L. H., *et al.*: Indust. Med. *29*:150 (April) 1960.
3. Beck, C., *et al.*: Clin. Med. *7*:519 (March) 1960.
4. Clinical Reports to the Medical Dept., Armour Pharmaceutical Co., 1959.

in accidental or surgical trauma

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DOME

1.) Stoughton, R. B.: Report To The Council; Steroid Therapy In Skin Disorders, J.A.M.A. 170:1311-1315 (July 11) 1959. 2.) Goodman, H.: Concentration of Topical Medications Dispersed in Evaporating Vehicles with Particular Reference to Hydrocortisone Alcohol, Clin. Med. 6:781-784 (May) 1959.

The exclusive ACID MANTLE vehicle potentiates the ingredients in DOME preparations . . . restores and maintains the normal protective acidity of the skin...and facilitates healing.

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Available as CREMES in 1 oz. tubes, 4 oz. and 1 lb. jars; and as LOTIONS in 4 fl. oz. bottles.

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another sinus headache on the loading platform?

"Gratifying" relief from

for your patients with
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POTENT muscle relaxation
EFFECTIVE pain relief
SAFE for prolonged use

stiffness and pain

"gratifying" *relief from stiffness and pain in 106-patient controlled study*

(as reported in J.A.M.A., April 30, 1960)

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Kestler, O.: Conservative Management of "Low Back Syndrome", J.A.M.A. 172: 2039 (April 30) 1960.

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EASY TO USE—Usual adult dose is one 350 mg. tablet three times daily and at bedtime.

SUPPLIED: 350 mg., white tablets, bottles of 50.
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Provera (medroxyprogesterone acetate) 2.5 mg.
Cardrase (ethoxzolamide) ..... 35 mg.
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DOSAGE: 1 tablet 1 or 2 times daily, 5-10 days before the period.

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to restore hormonal balance...

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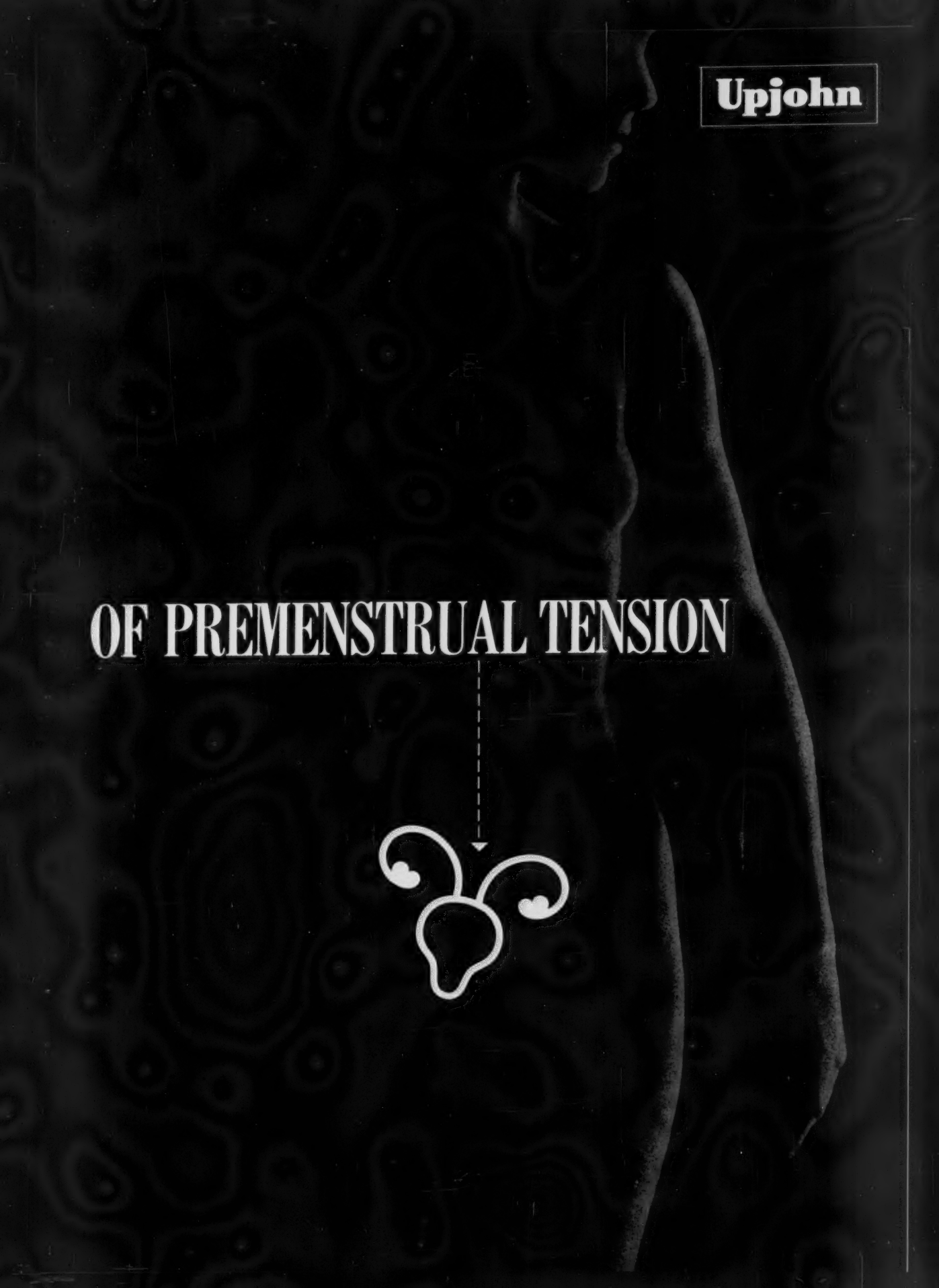
*TRADEMARK †TRADEMARK, REG. U. S. PAT. OFF.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the antihistamine
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two highly approved
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the expectorant that works best
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—added dihydrocodeinone
1.8 mg./5 cc.
when additional cough
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for less frequent, more productive cough

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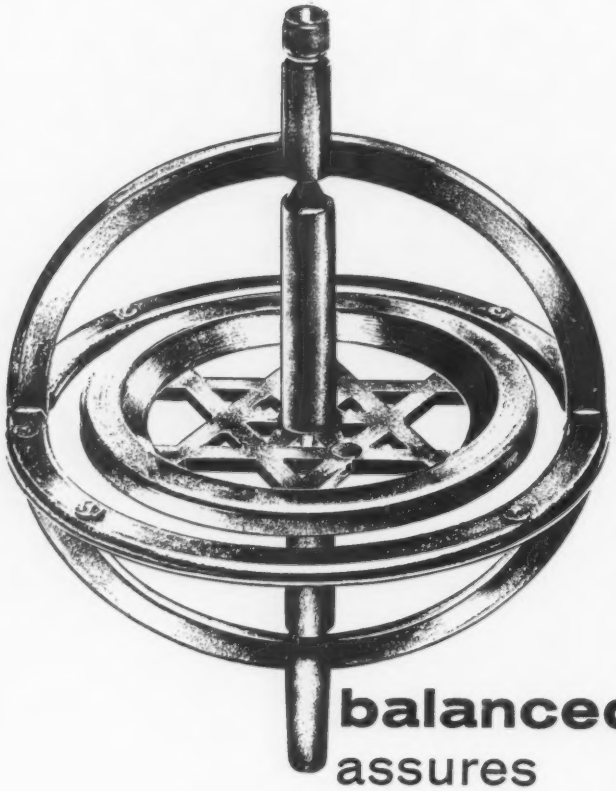

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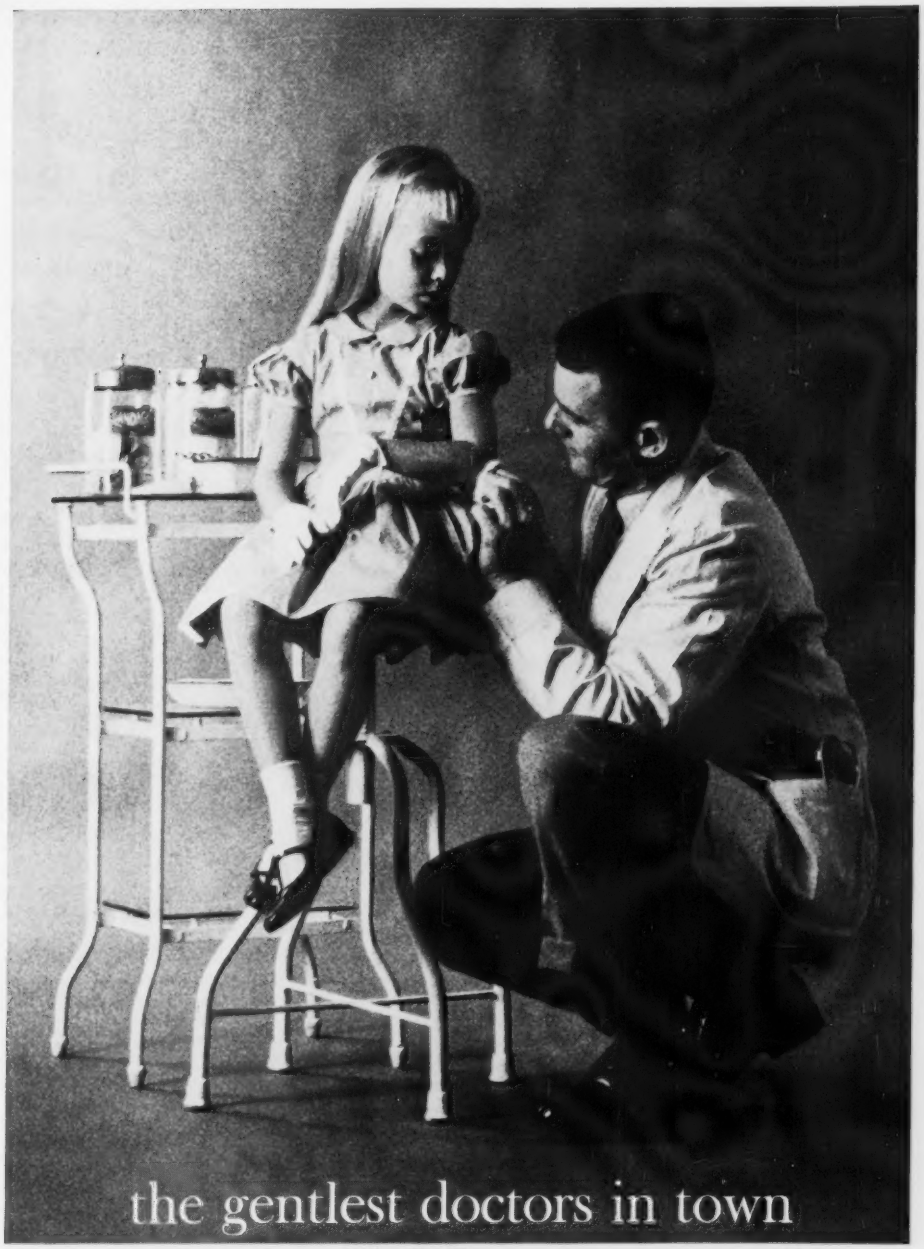

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The essential amino acid requirements of the normal healthy adult can be provided by 2.6 cups of milk. The minimum adult requirement for protein, when supplied by cow's milk, has been estimated by the Food and Nutrition Board as . . . 0.39 to 0.41 gm. per kilogram body weight for the adult man . . . 0.42 to 0.43 gm. per kilogram for the adult woman . . . increasing to 0.56 gm. per kilogram during pregnancy and 0.71 gm. per kilogram during lactation.

Thus minimum protein and amino acid needs could be satisfied daily by . . . 3.3 cups of milk for the 70 kilogram man . . . 2.9 cups of milk for the 58 kilogram woman . . . 3.8 cups of milk for the same woman during pregnancy . . . and 4.8 cups while she nurses her baby.

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The nutritional statements made in this advertisement have been reviewed by the Council on Foods and Nutrition of the American Medical Association and found consistent with current authoritative medical opinion.

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for relief of
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This new DRISTAN Dispenser contains 50 foil envelopes of 2 DRISTAN Tablets each. Convenient and sanitary, with proper dosage assured, designed especially for industrial medical use. Priced economically.

A NEW DEGREE OF SYMPTOMATIC RELIEF FOR SINUSITIS AND THE COMMON COLD

- VASOCONSTRICTOR action of phenylephrine hydrochloride.
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FIRST ORALLY EFFECTIVE AGENT IN RINGWORM

WELL TOLERATED • OBVIATES NEED FOR X-RAY EPILATION • USUALLY CLEARS SCALP RINGWORM WITHIN 4 TO 6 WEEKS

Dosage: Adults—250 mg. q.i.d. or 500 mg. b.i.d. Children—According to weight, 250 mg. to 1.0 Gm. daily, in divided doses.

Supplied: new 500 mg. scored yellow tablets, bottles of 20 and 100; and 250 mg. scored aquamarine tablets, bottles of 16 and 100.

*Newcomer, V. D., **et al.**: A.M.A. J. Dis. Child. **99**:585, 1960.

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Tinea capitis, before GRIFULVIN. Microscopic and Wood's light examinations help differentiate this infection from non-ringworm disorders.

After 5 weeks' treatment with GRIFULVIN. (Photo taken 1½ months after discontinuance of medication.)

340A60

Relief from moderate postoperative pain

DARVON® COMPOUND

(dextro propoxyphene and acetylsalicylic acid compound, Lilly)

effective · safe · well tolerated

The clinical usefulness of Darvon®, alone and in combination, has been confirmed by more than a hundred investigators in the treatment of over 6,300 patients. Under study were patients from every branch of medicine.

For example, 361 surgical patients received medication containing Darvon following major and minor surgery and in the emergency ward after surgical procedures. Of these, 274 (76 percent) obtained effective analgesia.

Darvon Compound combines the analgesic action of Darvon with the antipyretic and anti-inflammatory benefits of A.S.A.® Compound.

Usual dosage: 1 or 2 Pulvules® three or four times daily.

Also available: Darvon, in 32 and 65-mg. Pulvules.
Usual dosage: 32 mg. every four hours or 65 mg. every six hours.

Darvon® (dextro propoxyphene hydrochloride, Lilly)
A.S.A.® Compound (acetylsalicylic acid and acetophenetidin compound, Lilly)

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02/212

IMS

PROSTHETIC REPLACEMENTS
For the Partial Hand Amputee

• ROBERT G. THOMPSON, M.D.
• MICHAEL M. AMRICH, C.P.
Chicago, Illinois

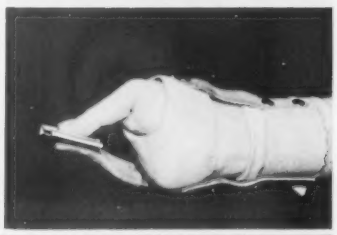
Modern machinery is the prime factor in the production of the material goods that are so desired by modern man. However, all too often this machinery has been responsible for grievous injuries to its operators. Particularly is this true of the power punch press. Workers using this device have suffered severe injuries to their hands, resulting in the loss of ends of fingers, whole fingers, and in some cases all of the hand. It is only recently that an attempt has been made to supply prostheses for these partial hand amputees. Thus, a review of possible solutions to some of these problems is presented to show what an amputee clinic team can do to aid some of these unfortunate victims.

The primary need of the partial hand amputee is a prosthesis which will afford opposition for the remaining finger or fingers, or stumps. With this opposing force, the amputee will be able to pinch, grasp and lift. Pinch will enable him to hold small objects, such as a nail, coin or match. Grasp will allow him to hold larger objects, such as a bottle, jar or telephone. Lift will provide the assistance for carrying gross objects, such as a tray of food, a box, a carton, or a suitcase. These and other normally two-handed activities are problems that the partial hand amputee has considerable difficulty in solving. Without the means of opposition, he uses various other parts of his anatomy such as the armpit, legs, feet, wrists, or palm of the other hand to assist his deformed hand. These substitute methods make performance conspicuous and sometimes embarrassing to him. By providing a prosthesis with a post for opposition, these activities can be carried on without the necessity for agile acrobatics. An added benefit of the prosthesis is the protection that it provides for the remaining stump.

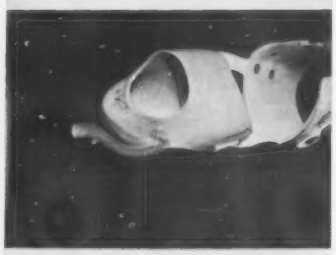
A survey of the partial hand amputations seen at the Liberty Mutual Rehabilitation Center in Chicago was made and the various types catalogued. The most common type was that in which all of the fingers had been amputated, but in which a normal thumb remained. The next most common type was that in which the thumb remained with a single digit, or parts of a digit. The third most common type was that in which the thumb had been amputated and various finger combinations remained, while the fourth most common type was the transmetacarpal amputation.

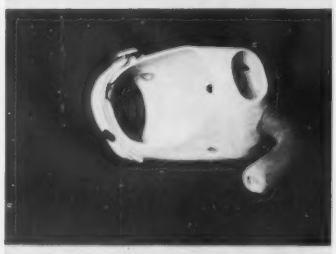
Case 1 (Left)
Male Age 24
Punch press injury. Amputation second, third, fourth and fifth fingers at the metacarpal-phalangeal level. Prosthesis: laminated plastic, metal opposition post covered by rubber tubing.

Case 2 (Right)
Male Age 21
Right hand caught in power machinery. Amputation, proximal third of the second and third metacarpals, and at fourth and fifth metacarpal-phalangeal joints. Prosthesis: plastic laminate with metal strip, opposition post covered by elastic tubing.



Case 3 (Left)
Male Age 63
Right hand caught in power machine. Amputation second finger at the metacarpal-phalangeal level, third and fourth fingers at the midcarpal level, and removal of the entire fifth metacarpal. Prosthesis: plastic laminate molded over the stump of the second finger, a metal strip post covered by gum rubber tubing. A leather arm cuff to promote stability.





Case 4 (Right)
Male Age 29
Punch press accident. Amputation index finger, mid parts of index finger and the proximal phalanx, third, fourth and fifth fingers at the metacarpal-phalangeal levels. Prosthesis: plastic laminate with a curved post covered by gum rubber tubing. No arm cuff was required for stability.

Pre-Prosthetic Evaluation

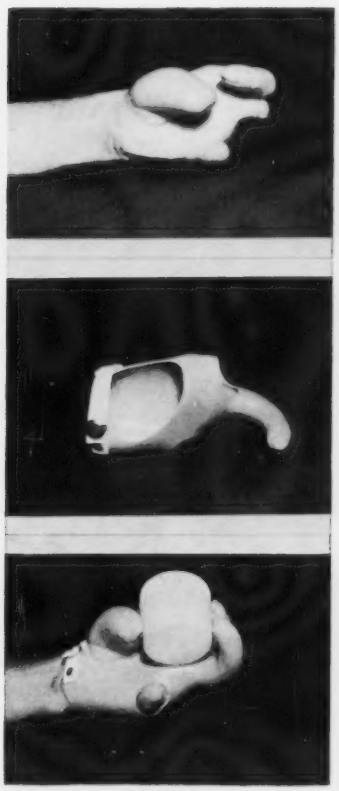
When a partial hand amputation patient is first seen, problems are occasionally met which must be treated before the prosthetist can devise an adequate fitting. One of these problems is a limitation of range of motion, particularly in the wrist, elbow and shoulder. Shoulder stiffness is particularly noted in hand amputees who have worn a sling for any sustained length of time and who have not been instructed by the physician in proper shoulder exercises from the day of injury.[1] Because the arm or hand has been protected, the remaining musculature of the arm may be quite weak, and a muscle exercise program must be undertaken. There are occasional muscle re-education problems, although these are not too prominent in this type of injury. The stump itself very often reveals marked tenderness and sensitivity, as well as edema or induration. The patient is started on a supervised program of therapy, including both physical and occupational therapy, for varying periods of time.

When, in the opinion of the amputee clinic team (surgeon, prosthetist and therapist), an amputee is ready for his prosthetic fitting, a definite prescription is made.

Prostheses

The features of a good partial hand utility prosthesis are simplicity, practicality and durability. The complicated or grotesque-appearing, bulky prosthesis will soon be discarded by the amputee as being too conspicuous to warrant its use. Likewise, the prosthesis that will not help him to perform his job or daily living activities also will soon be set aside. Although the prosthesis needs to be as light and attractive as possible, it also has to be constructed in such a fashion that its durability under heavy duty working conditions can be relied upon.

In fabricating the partial hand prosthesis the first step is to make a plaster wrap cast of the stump. Measurements of the stump are taken and tender areas are recorded on the "female" plaster socket for future use. A positive male plaster mold is then prepared for socket lamination. From experience, we have found that about six layers of nylon stockingette, laminated with a standard mixture of 50% rigid and 50% flexible resin, will give the most durable and reliable prosthesis socket. This lamination technique can be performed in one operation if the contour of the stump permits, and the opposition post or base can be placed in the proper location between

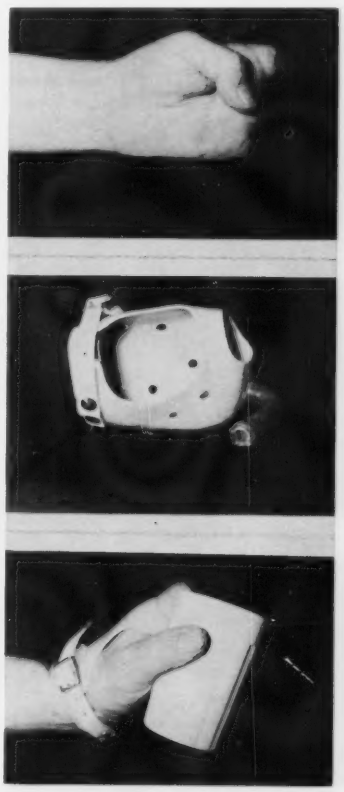


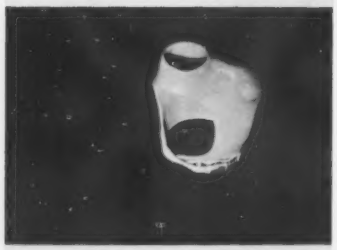
Case 5 (Left)
Male Age 30

Amputation of the thumb through the proximal portion of the proximal phalanx. A full thickness skin flap tried as a lengthening procedure, utilizing a bone graft; however, restricted motion present. Amputation of the middle finger at the distal end of the proximal phalanx ring finger at the metacarpal phalangeal level and small finger at the mid-portion of the proximal phalanx. Prosthesis: plastic laminate with a small socket and prolonged post, utilizing the stump of the middle finger. No wrist cuff needed for stability.

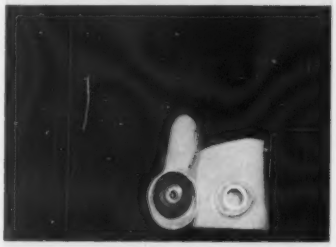
Case 6 (Right)
Male Age 29

Punch press injury. Amputation to the proximal phalanx of the index finger, third, fourth and fifth fingers amputated at the metacarpal-phalangeal level. Prosthesis: plastic laminate with a single metal post, covered by gum rubber tubing; no wrist cuff was needed for stability.



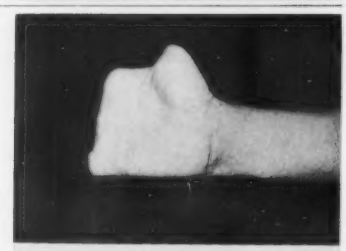


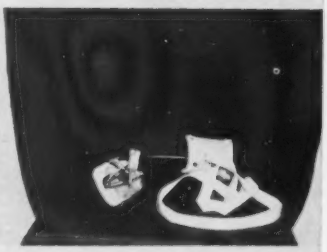
Case 7 (Left)
Male Age 45
Punch press injury. Amputation through the midphalanx of the index finger and the distal portion of the third, fourth and fifth metacarpals. Prostheses: several types of prostheses utilizing different posts were tried but a simple build-up of the ulnar side of the prostheses was found to be quite satisfactory.



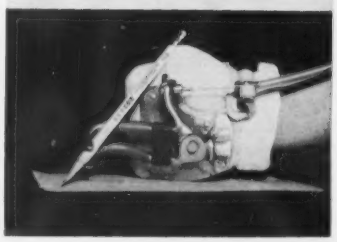
Case 8 (Right)
Male Age 27
Previous amputation, right thumb; present injury resulted from slicing machine accident, amputation of the second, third and fourth fingers in the proximal phalanges. Prosthesis: a friction type thumb post for opposition.

Case 9 (Left)
Male Age 61
Right arm caught in pulley during fall from scaffold. Avulsion of the thumb, second finger with metacarpal. Prostheses: plastic socket with the thumb from a prosthetic hand utilized as an opposition post.





Case 10 (Right)
Male Age 46
Punch press injury. Amputation of thumb and all fingers at the metacarpal-phalangeal level. Prosthesis: a plastic socket with an opening for the thumb stump, a Dorrance #8 hook was attached by plate to the palmar aspect of the prosthesis, activated by a shoulder loop harness on the opposite shoulder.

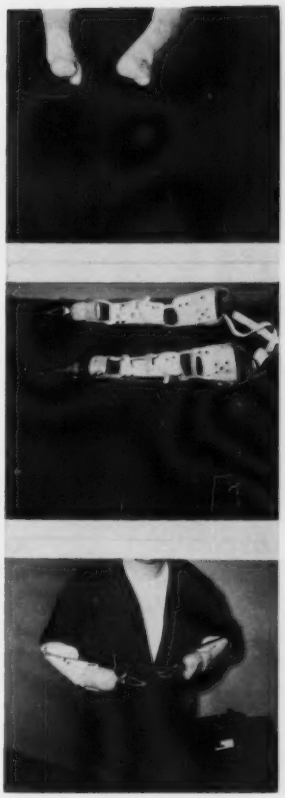


the third and fourth layers of stockingette. However, if the prosthetist desires, the post can be bound, or tacked in place, after the first lamination of three layers have been cured and the second lamination can then be completed over the first. If reinforcement of the post for stability is necessary, a cap or caps can be placed around the post for rigidity. The final fitting and trimming of the socket is done by the trial and error method. A general rule to follow is that the socket must be trimmed sufficiently to allow, where feasible, a complete range of motion of all the remaining joints. For example, on a thumb remaining socket, the trim line must extend at least to the palmar crease of the thumb. Care must therefore be taken not to extend the post plate into this area. In cases of extremely tender stumps, a soft socket may be used. However, this will add to the bulk of the prosthesis.

The opposition post and base plates can be cut and shaped from any flat stock of durable metal 3/32 to 1/8 of an inch thick. A more durable post will result from a one-piece construction. Regardless of the material used, the most important aspect of the fitting is the positioning of the post. The proper position is determined at the initial cast time and is based on the needs of the amputee and on the angle and range of motion in the remaining digits. For example, in many cases where the thumb alone is present, the ideal position of the post (for maximum grasp and pinch) is at a point between the third and fourth fingers with the post rotated to the thumb. Where the thumb is missing and must be replaced, we have utilized an APRL, or a friction thumb, with good results. The most acceptable position of the thumb is just medial to the base of the first metacarpal. Movable thumb and opposition posts can also be improvised. However, these are more complicated and a reduction of force and durability results from their use.[2]

Fitting of the transmetacarpal amputation is quite similar to that of the wrist disarticulation amputee. Inasmuch as we desire to retain all range of wrist motion possible, including pronation and supination, the utility hooks must be laminated or attached to the distal or palmar area of the socket in order not to project an unseeming distance from the sleeve. The socket can then be attached to the wrist cuff, utilizing flexible wrist joints, and the socket can be made removable by the use of a buckle or snap at the base of the thumb. We have used nylon tape to provide strength and flexibility for these hinges.

Cases 1 through 4 show the type of prostheses used when all fingers were amputated and the thumb remained. These prostheses are each slightly different in design, but each one is basically a simple socket with an opposition post. It is of interest to note, in reviewing some of these amputees, that a few preferred the flat metal post to that of a post with a rubber tubing covering. However, this may be a matter of individual preference. In Case 5, the small stump of the little finger was covered with a plastic socket which was used as the opposition post. In Case 6, there was enough stump remaining in the index finger to be of partial help in grasping, but an additional post at the level of the fourth finger gave much better functional use of the hand and prosthesis. In Case 7, the socket had a slight build-up in the area of the fourth and fifth metacarpals which gave sufficient opposition, coupled with the remaining stump of the index finger, to do a more satisfactory job of grasping. This patient tried several types of prostheses and eventually preferred the one described. In Cases 8 and 9, where there was absence of a thumb, the prosthesis supplied the thumb post for opposition. Case 10 presented a partial loss of thumb and of the fingers at the metacarpal-phalangeal joint level. Since this patient has some pinch possible between the remaining thumb and stump, it was decided that this should not be covered. A partial socket was made, on which a Dorrance 8 hook was used for pinch and grasp. Case 11 was a transmetacarpal



Case 11
Male Age 29
Punch press injury to both hands: the left — a transmetacarpal amputation; the right amputation of the thumb through the metacarpal - phalangeal joint, the second, third, fourth and fifth metacarpals through a proximal area. A surgical attempt to deepen the web space between the first and second metacarpals was only partially successful. Prosthesis: two prostheses with small, close-fitting sockets, leather wrist cuff, triceps pads, flexible Dacron hinges at both wrist and elbow level, a modified figure-of-eight harness, Dorrance #8 stainless steel hooks.

amputation of both hands. The patient was fitted with an essentially carpal or transmetacarpal type of prosthesis, with small, snug-fitting sockets, flexible hinges at the wrist and elbows, and operation of a Dorrance 8 terminal device by forward shrug of either shoulder.

Summary

The fitting of the partial hand amputee with a utility prosthesis enables him to obtain the opposition which he lacks for performing activities, including pinch, grasp and lift. The most suitable partial hand utility prosthesis is one that is simple, practical and durable. The needs of the amputee, the level and condition of the stump, are determining factors in the prosthetic prescription. Materials and parts necessary for the construction of prostheses are simple and readily obtainable. However, the ingenuity and skill of the prosthetist will often be a determining factor in the success or failure of the prosthesis. Of 15 cases of partial hand amputations, nine of the patients were injured in punch press accidents, three by other types of machinery, two by cleaning machines, and one by a falling scaffold. Thirteen of the 15 patients returned to gainful employment, one patient retired and one started school. Three of the 13 patients returned to punch press work, two purchased small businesses, one became a truck driver, and the remainder turned to shipping, maintenance, stock room or assembly line type of work. It is also of interest to note that seven returned to work at the same salary, four at a lesser salary, and two at a greater salary.

References

1. THOMPSON, ROBERT G. and COMPERE, EDWARD L.: Iatrogenic Stiff Shoulders. *J. Am. Med. Assoc.* 169:945, 1959.
2. THOMPSON, ROBERT G. and AMRICH, MICHAEL: A Prosthetic Thumb for the Partial Hand Amputee. *Orthop. Pros. Appl. J.* 10:31, 1956.

New Weight Standard

Too many American adults weigh more than is good for them. A recently published study of the Society of Actuaries (Build and Blood Pressure Study, 1959) shows that one in every five men is at least 10% above average weight, and that more than one in 20 is at least 20% above average. For women the corresponding proportions are somewhat higher.

But average weight, it develops, is not the most desirable weight; today's average American is too heavy for his own good. It was made clear from the Society of Actuaries' study that people who are appreciably below average weight experience the lowest mortality. From the findings of the study, the Metropolitan Life Insurance Company's statisticians have constructed new standards of desirable weights. These desirable weights (in indoor clothes) for men and women at ages 25 and over according to height (in shoes) and type of frame, are shown in the tables opposite.

Prepared by the Metropolitan Life Insurance Company. Derived primarily from data of the Build and Blood Pressure Study, 1959, Society of Actuaries.

DESIRABLE WEIGHTS FOR MEN AND WOMEN
According to Height and Frame. Ages 25 and Over
Weight in Pounds (in indoor clothing)

Height (in shoes with 1-inch heels)	Small Frame	Medium Frame	Large Frame
		Men	
5′ 2″	112-120	118-129	126-141
5′ 3″	115-123	121-133	129-144
5′ 4″	118-126	124-136	132-148
5′ 5″	121-129	127-139	135-152
5′ 6″	124-133	130-143	138-156
5′ 7″	128-137	134-147	142-161
5′ 8″	132-141	138-152	147-166
5′ 9″	136-145	142-156	151-170
5′10″	140-150	146-160	155-174
5′11″	144-154	150-165	159-179
6′ 0″	148-158	154-170	164-184
6′ 1″	152-162	158-175	168-189
6′ 2″	156-167	162-180	173-194
6′ 3″	160-171	167-185	178-199
6′ 4″	164-175	172-190	182-204
(in shoes with 2-inch heels)		Women	
4′10″	92- 98	96-107	104-119
4′11″	94-101	98-110	106-122
5′ 0″	96-104	101-113	109-125
5′ 1″	99-107	104-116	112-128
5′ 2″	102-110	107-119	115-131
5′ 3″	105-113	110-122	118-134
5′ 4″	108-116	113-126	121-138
5′ 5″	111-119	116-130	125-142
5′ 6″	114-123	120-135	129-146
5′ 7″	118-127	124-139	133-150
5′ 8″	122-131	128-143	137-154
5′ 9″	126-135	132-147	141-158
5′10″	130-140	136-151	145-163
5′11″	134-144	140-155	149-168
6′ 0″	138-148	144-159	153-173

OCCUPATIONAL HEALTH

In Relation to the Health Services of Great Britain

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The National Health Service in Great Britain was introduced in 1911; the present phase commenced on July 5, 1948. Since then the Service has attracted world-wide interest. The first 10 years have passed, not without troubles; but as commitments are increasingly matched by resources, the difficulties are resolving. Whatever the defects in conception and practice the Service is among the most advanced and comprehensive in the world.

The Service has three divisions, Hospital and Specialist Service, General Practitioner, Pharmaceutical and Supplementary Ophthalmic Services, and services administered by the Local Health Authorities. At the inception the Government considered the inclusion of an Occupational Health Service but for various reasons the idea was postponed. This, however, does not signify that meantime there is no practice of occupational health; indeed England was the pioneer in this field. Commencing in 1733, statutory services under the Factory Inspectorate have since been developed and have become a model for industrial countries throughout the world. In the last 50 years these have been progressively supplemented by nonstatutory or voluntary services. A proper understanding of occupational health practice in Great Britain, as in fact in any country, demands an intimate knowledge of the general health and associated welfare services. This can only be inadequately provided in a short essay or even by visits to our factories and teaching departments. The need is for more overseas colleagues to come and live with us and participate in our way of living for several months.

Great Britain, that is to say, England and Wales and Scotland, has an area of 88,000 square miles with a population of about 50 million persons. The comparative significance of these figures emerges from the following figures:

TABLE I.
Area and Population of Selected Industrial Countries and States*

Country or State	Area (square miles)	Population (thousands)
Great Britain	88,000	49,811
New York State	49,576	16,124
Pennsylvania	45,333	11,159
Illinois	56,400	9,361
California	158,693	13,032
France	213,000	43,787
Sweden	173,436	7,290
Italy	131,000	49,191
Finland	130,127	4,116
New Zealand	103,700	2,244

*Source: Whitaker's Almanac, 1958, London.

In Great Britain there are about 10 times as many people to the square mile as in the United States. Eighty percent of the population lives in towns; seven great urban areas, whose centres are London, Manchester, Birmingham, Leeds, Liverpool, Newcastle-upon-Tyne and Glasgow, contain nearly 40% of the population. Greater London has a population of over eight million. In Birmingham it is estimated that there are over 1,500 different trades.

Britain is basically an industrial manufacturing country. The only substantial natural raw material is coal, the use of which is increasingly being replaced by oil, hydro-electric and atomic power. Richard Arkwright, inventor of textile machinery, founded the factory system in England in 1771. The system is now the oldest and most intensively developed one of its kind in the world. Many of the early factories are still in use, and as exemplified by pottery works in North Staffordshire still reflect the cottage industries from which they derived. By modern

standards of building and layout, many are old and dilapidated and hemmed in by workmen's houses of like age and construction. But not all factories and houses are decrepit, unhealthy and lacking in modern amenities. On the contrary, there are extensive modern housing and industrial estates and magnificent factories, foundries, steel and oil plants, chemical works, textile mills, potteries, and brickworks of the most modern design and equipment. Large American organizations have established plants similar to those operated by them in the United States.

Of the population of 50 millions, 23 millions are engaged in remunerative employment, which is not permitted until after the attainment of the fifteenth birthday—and minimum school-leaving age—and continues until retirement at the age of 65 years in men and 60 years in women. Many workmen continue at work beyond the arbitrary age at which Retirement Pensions become due.

At June 30, 1958, the constitution of the population was as follows:

TABLE II.
Population of Great Britain by Sex and Age Groups

	Thousands Great Britain		
Age Groups	Total*	Males	Females
Total, all ages	49,811	23,978	25,833
0-14	11,454	5,861	5,593
15-21	6,212	3,067	3,145
25-49	17,588	8,696	8,892
50-64	8,858	4,095	4,763
65 and over	5,699	2,259	3,440

*Excluding H.M. forces overseas

The working population at July 31, 1959, comprised:

TABLE III.
Number in Civil Employment

	Thousands
Total	23,054
Men	15,245
Women	7,809
Number in Major Civil Employments	
Mining and Quarrying	819
Gas, Electricity and Water	374
Transport and Communication	1,673
Agriculture and Fishing	1,009
Manufacturing Industries	9,121
Building and Contracting	1,496
Distributive Trades	2,961
Professional, Financial and Miscellaneous Services	4,300
Government Service	519
Local Government	782

Of the 23 million persons in civil employment only about one half are employed in factories and other places subject to the Factories Acts. These factories vary considerably in size and in numbers employed. The overwhelming majority are small as shown by the figures in Table IV from a survey undertaken by H. M. Inspectors of Factories in 1948.

TABLE IV.
Analysis of Factories According to Numbers Employed

Number of workmen	Less than 26	26-50	51-100	101-250	Over 250	Total
Number of factories	202,868	18,207	10,475	7,335	4,884	243,769

Since the above survey the total number of factories has declined annually, and at the end of 1958 the total was 223,085. The general pattern, however, is substantially unchanged.

Health and Welfare

The National Health Service is only part of a comprehensive system of social welfare covering sickness, industrial injury, disablement, rehabilitation and resettlement, unemployment, retirement and maternity benefits and family allowances. The system is closely integrated and administered under Acts of Parliament and is based on Social Insurance. Subject to certain statutory exceptions every person domiciled in Great Britain who is over school-leaving age (15 years) and under pensionable age (65 years-men: 60 years-women) is insured under the Acts. There are three classes of insured persons: employed, self-employed and non-employed.

Insurance contributions are paid weekly by insured persons and, if employed, also by their employers. The total collected funds are supplemented by monies provided by Parliament from the national revenue. As an example, an employed male age 18 or over pays 9s. 11d. and his employer 8s. 3d., a total of 18s. 2d. per week. These payments are comprehensive of all benefits; the National Health Service contribution which is included in the combined rate amounts to 2s. 2d. and the Industrial Injuries contribution to 1s. 5d. As a measure of these amounts the average weekly earnings of manual workers is 222s 6d. (20s. = $2.80). Benefits are based on

TABLE V.
Classification of Persons for Whom Contributions Were Payable During the Year 1957
Great Britain — Millions

	Men & Women	Men	Spinsters, Widows & Divorced Women	Married Women
All persons	24.21	16.39	4.12	3.70
Employed persons:				
(a) themselves contributing	19.47	14.66	3.53	1.28
(b) employers contributing only	2.87	0.26	0.27	2.34
Self-employed persons	1.38	1.26	0.10	0.02
Non-employed persons	0.49	0.21(a)	0.22	0.06

(a) The Government Actuary's Department has since revised this figure to 0.19 in the light of information which has become available since the Interim Report was printed.

subsistence level for the insured person and his dependents. Sickness benefits illustrate these. The standard weekly rate for a man or woman over 18 years of age (except a married woman) is 50s. with increases of 30s. for an adult dependent, 15s. for the eldest dependent child and 7s. for each other dependent child. The difference between dependent children is explained by the fact that out of taxation revenue the Government provides family allowances for each child after the first: 8s. a week for the second child and 10s. a week for the third and each younger child.

The foregoing facts may appear remote from the subject of the development of occupational health services, but they are absolutely relevant as they represent measures directed to ensure to all persons in all circumstances and at all times a minimum subsistence. This provides a continuing sense of security throughout life and is an important contribution to the maintenance of health—physical, mental and social.

Against this background it is now possible to review briefly the General Health Services. Their purpose quite simply is to make available at all times, to all persons, irrespective of age, social class or financial means, the highest medical skill and the full range of medical services, diagnostic, treatment, hospital accommodation and rehabilitation. There is one test and one only, need. The services are free apart from minor charges for dentures, spectacles, surgical appliances and prescriptions. These are recent amendments introduced to curb abuses and extravagant claims. It has been emphasized that all persons must contribute (wife and children are covered by husband's contributions), but there is no compulsion to use the Health Service; any person can seek private care but he must pay all costs.

The responsibility of the National Health Service has been defined as being that of bringing the patient to full recovery, or, if that is not possible and permanent disability follows, to that stage of physical and mental fitness that will allow resettlement in alternative work or retraining to be commenced. While the individual is entitled to seek periodic supervision of his health, people are not health conscious, so that this facility is rarely used. This signifies that as yet the Service is mainly directed to the treatment of sickness rather than the supervision and promotion of health. Accordingly some critics have argued, and not without reason, that it is a disease and not a health service.

Earlier it was recorded that the National Health Service has three main divisions: general practitioner services, consultant and hospital services and public health services. A short description of the main features of these services may assist proper understanding.

General Practitioner Services

The general practitioner or private doctor is the key person in the service and is the first line of approach by the patient. Each insured person is required to select his own doctor, that is, to join his list or panel. While it is possible to change from one doctor's list to another's, this is controlled by regulation. Doctors are not compelled to participate in the Health Service but 97% do. A single-handed practitioner may accept responsibility for 3,500 persons; remuneration is by annual capitation fee (23/- equivalent to 3.5 dollars).

In the event of illness or suspected sickness the patient consults his doctor. This means that in the main the general practitioner undertakes the care and management of all minor sickness and accidents. In more serious cases he can obtain on behalf of the patient the assistance of a specialist either at the patient's home, at the outpatient department of a hospital—this is the most common—or if necessary in hospital. On discharge from hospital the private doctor manages the convalescent stage until recovery is achieved and the patient returns to work. Should the patient be unfit for work the doctor can arrange, through the Ministry of Labour, for a course of re-ablement in an Industrial Rehabilitation Unit, or vocational training for alternative work in a Government Training Centre. If the workman is very severely handicapped he may seek employment in a Sheltered Workshop under a government corporation named Remploy. In an aging population the care of the aged and the chronic sick constitutes a considerable load on the general practitioner, which is aggravated by a dearth of hospital accommodation for such cases. This situation, however, is progressively being remedied as beds become available in sanatoria through the decline in tuberculosis cases.

Consultant and Hospital Services

Consultants and specialists, covering the whole range of medical and surgical practice, serve either whole or part-time in the Health Service. Their work is based on the hospitals where they consult in outpatient clinics and carry out treatment in the wards. When required by the general practitioner they are available for domiciliary consultations. The hospitals provide complete diagnostic services in special departments, treatment, and a measure of rehabilitation in departments of physical medicine. Social services to patients and their dependents are provided by almoners—trained welfare workers—who investigate the social factors. They also

render valuable service in follow-up studies of individuals and groups of cases.

At the inception of the Health Service a radical change was introduced by transferring responsibility for the clinical care of infectious diseases, tuberculosis and venereal diseases from the Public Health Authority to the Hospital Services.

The Consultant and Hospital Services are essentially clinical and so based on diagnosis and treatment. Criticism is frequently made that they lack a preventive outlook. In a measure this is true, but early diagnosis and effective treatment are preventive in so far as they diminish the duration and ill effects of accident and disease.

Local Authority Services

This is otherwise known as Public Health (State Medicine) and is the responsibility of the municipal or county authorities. It is concerned with the group or community rather than with the individual. Its function is the conservation of health through prevention. The means include the provision and maintenance of good housing and clean water supplies, control of air pollution, and the disposal of sewage and refuse. In the narrower medical field, they are responsible for antenatal, maternity and child welfare services, school health, and youth employment services. In addition, they assist in the prevention and control of infectious and contagious diseases by educational propaganda, by vaccination against smallpox, diphtheria, measles, whooping-cough, tuberculosis, tetanus and poliomyelitis. Port sanitary work and food hygiene are among their other duties. They have duties under the Factories Acts in the supervision of washing and lavatory accommodation in non-mechanical factories; these are in the main small factories and workshops. Under the Shops Acts they are responsible for the sanitary supervision of shops. Finally, it is their duty to enforce regulations for the prevention of fire and the provision of means of fire escape.

Industrial Health Services

Against this background of general health services it is now possible to consider the arrangements for occupational health. Again it must be underlined that they are not part of the National Health Service. Industrial health services are two-fold, statutory and voluntary.

Statutory Services

Factories. Statutory services in factories are the function of the Factory Department of the Ministry of Labour and National Service and not, as might be thought, of the Ministry of Health. The Factory Inspectorate is responsible for safety, health and welfare but only in factories covered by the Factories Acts, 1937-1959, and related Orders and Regulations.

The administration consists of a headquarters staff in London under the direction of the Chief Inspector of Factories, who is responsible to the Minister of Labour. The country is divided into divisions and these in turn into areas and districts, each with appropriate staff. At the end of 1958 (latest available report) the total number of inspectors in post was 407, including engineering, electrical and chemical inspectors and 17 medical inspectors (this number has since been increased to 19). The technical inspectors are mainly employed in enforcing compliance with the Factories Acts, Orders and Regulations. While on occasion they prosecute offenders, their real concern is to assist employers by advice and help in problems of safety, health and welfare. This means that their work is concentrated on safety through accident prevention, on environmental conditions, particularly in relation to dust, fumes and other harmful materials, and general welfare.

The medical inspectors are more directly concerned with health problems and, when required, act as advisors to their technical colleagues. In addition to general supervision their duties include research into industrial hazards and diseases. They superintend the work of the Appointed Factory Doctors.

Appointed Factory Doctors. Under the Factories Acts certain routine medical examinations are prescribed. These are carried out by the Appointed Factory Doctors (A.F.D.), originally (in 1844) the Certifying Surgeons, of which there are at present about 1,700 covering each factory district throughout the country. As a rule these appointments are held by local general practitioners. The work is not part of their duties under the Health Service, and payment, according to a prescribed scale of fees per examination, is made directly by the employer to the doctor.

The duties of the Appointed Factory Doctor are: (a) Examination of young persons on entry to factory employment at age 15 years and thereafter annually until the age of 18 years so long as they continue in factory employment under the same or other employer. During 1958, 453,089 examinations were made, of which 55% were males and 45% females. Initial examinations accounted for 239,964 and subsequent examination for the remainder. The content of these examinations is very restricted as the purpose is simply to decide if the candidate is physically and mentally fit to undertake or continue in the particular job in which he or she is to be

TABLE VI.
Industrial Diseases

Disease	Reported Cases 1900	1910	1920	1930	1940	1950	1958
Lead poisoning	1058[28]	505[28]	289[44]	265[32]	108[6]	57	55
Phosphorus poisoning	3	—	—	—	—	—	3
Mercurial poisoning	9	10[1]	5	3	5	3	4
Arsenical poisoning	22[2]	7	3	1	2[2]	—	—
Manganese poisoning	—	—	—	—	—	—	—
Carbon bisulphide poisoning	—	—	—	—	1	—	—
Aniline poisoning	—	—	—	24	64	6	7
Chronic benzene poisoning	—	—	—	—	3[2]	2[1]	—
Toxic jaundice	—	—	6	—	20[4]	—	1[1]
Toxic anaemia	—	—	—	—	—	—	—
Compressed air illness	—	—	—	—	3[1]	46	11
Anthrax	37[7]	51[9]	48[11]	43[6]	37[5]	36	6
Epitheliomatous ulceration	—	—	45[1]	194[36]	166[15]	195[13]	176[16]
Chrome ulceration	—	—	126	95	121	143	205

The principal figures relate to cases; the raised figures to deaths.

employed. (b) The examination of male young persons over age 16 years for employment at night in certain industries (blast furnaces, steelworks, forges, glassworks and paper works): re-examination before end of three months and thereafter before end of each six-monthly period. (c) Examination of workmen in certain processes specified as "dangerous": manufacture of lead compounds (weekly), chromium plating (fortnightly), chemical works (monthly), and turning of hollow ware (3-monthly).

Many dangerous processes are not covered by these regulations but employers are advised and encouraged to provide periodical medical examinations.

To discover risks and facilitate medical investigation and supervision, the Act requires notification to the Chief Inspector of Factories of reportable accidents, dangerous occurrences and certain industrial diseases. Table VI summarizes the occurrence and trend of notifiable industrial diseases in factories in the present century. These figures reveal that the absolute number of cases of industrial poisoning is low. This fact has induced the criticism that too much emphasis is focused on industrial diseases, which, by comparison with such community diseases as pneumonia, influenza and the common cold, are insignificant in their incidence and frequency. Furthermore the trend, with the exception of epitheliomatous and chrome ulceration, is progressively downwards and this notwithstanding the steady increase in the use of toxic materials and the number of persons at risk. The real significance of the low incidence and trend to lower levels is that they indicate the effectiveness of preventive measures, technical and medical.

This is the age of synthetic fibres, plastics, atomic energy, complex organic chemicals and rare metals. In these advances, due to experience, the potential hazards to health are anticipated and investigated in advance. It is a remarkable testimony to this prevision that casualties from ionizing radiations, organic insecticides and pesticides, beryllium and other rare metals have been exceedingly few.

Medical Supervision in Dusty Occupations. Throughout the past 25 years the dust diseases of the lungs, the pneumoconioses, have constituted a very serious problem in Great Britain. After an almost epidemic increase among coalminers in the mid-forties there is now happily evidence that these chronic incapacitating and often fatal diseases are diminishing both in incidence and severity.

There is a statutory scheme of medical examinations in the sandstone, refractories, pottery and asbestos industries. The examinations are conducted by the Pneumoconiosis Medical Panels of the Ministry of Pensions and National Insurance and apply to workmen in prescribed dusty processes. The examinations, which are conducted at the place of work, are of two kinds, initial on first engagement and periodical at intervals of two years. It is a defect of these examinations that radiographic examination of the lungs is not routine but entirely at the discretion of the examining doctor.

Mines and Quarries. The Ministry of Power includes an Inspectorate of Mines. The system is modeled on the older system of the Factory Inspectorate and applies to safety, health and welfare in mines — of all kinds — and quarries.

Examination of Coal Mines. Under the Coal Mines (Medical Examination) General Regulations, 1952, all persons under the age of 21 years seeking employment in any coal mine must undergo a complete medical examination, including radiographic examination of the lungs. These initial examinations are completed by the full-time medical officers of the National Coal Board. The purpose of the examination is to ensure that the candidate is free from disease of the lungs and otherwise fit for employment as a miner. At the end of 1958 a scheme of periodical radiographic examinations of all coal miners, at intervals of five years, was introduced. In addition the National Coal Board maintains a comprehensive medical service at the pits for all coal miners.

Disabled Persons (Employment) Act, 1944. Although not strictly a statutory medical service, mention must be made of the Disabled Persons (Employment) Act which has for its purpose the employment of registered disabled persons, that is to say, persons who by reason of "injury, disease or congenital deformity either physical or mental are substantially handicapped"

in obtaining or keeping employment suited to their age, experience and qualifications. To implement this purpose every employer of 20 or more persons must by law employ not less than 3% of his total work people from the register of disabled persons.

Voluntary Medical Services in Industry

Voluntary medical services in industry are those instituted and maintained by the employer and without statutory obligation. In some instances, as in nonfactory employments, they may be the only service, but in factories they do not replace but supplement the statutory services. This may result in some overlapping. Previously it was emphasized that the statutory services are limited in their content and scope; voluntary services by contrast may be as limited or liberal as the individual employer is willing to afford. This is revealed by the fact that in some organizations the annual cost amounts to about eight shillings per person whereas in others it is as many pounds; that is, from one to 22 dollars.

The first noteworthy feature of voluntary services is that, unlike the statutory services, they are not restricted to factories but include workers in all forms of employment, offices, shops, transport, air, rail, road and sea, mines, gas and electricity undertakings, docks and building operations.

While in some instances the services of doctors and nurses are limited to the care of accidents and general supervision of health and environment, in others they include dental, ophthalmic, physiotherapy, chiropody and rehabilitation services combined with x-ray, electrocardiography and laboratory services and reablement and training workshops. From this it follows that the program in individual firms depends largely on their size, outlook of management, nature of the work and production, specific hazards and the prosperity of the company. Furthermore the materials handled and the nature and conditions of the processes tend to define the content and the emphasis of the service. Thus heavy industry and engineering are primarily concerned with the care of accidents through skilled treatment, physiotherapy and rehabilitation, while light luxury industries concentrate on general medical supervision, preplacement and periodical examinations and environmental hygiene. In the chemical industries the main effort is directed against toxicological hazards and research into the possible effects of new substances.

Extent of Voluntary Services in Industry. This is difficult to define. So far as factories are concerned, the matter was comprehensively surveyed by the Factory Inspectorate in 1948. Since then there has been some advance but chiefly in the large units. It is estimated that about 50% of all workers in factories are covered to some extent by medical and/or nursing services. The main incidence, however, is in the large organizations. In small firms up to 50 workers services are almost nonexistent. This is a significant point as 90.7% of all factories are in this category. Many of these carry on dangerous processes under bad working conditions. Similarly, shops and offices, which are seldom covered, are, in the main, small units, and in many working conditions are defective if not indeed harmful.

TABLE VII.
Factory Medical Services

Factories with Medical Services Other Than Statutory Examination of Young Persons for Certificates of Fitness (Great Britain), 1948

	Factories with					
	Less than 26 Workers	26-50 Workers	51-100 Workers	101-250 Workers	Over 250 Workers	Total
1. Number of factories in Great Britain	202,868	18,207	10,475	7,335	4,884	243,769
2. Number of factories with definite arrangements for medical services (other than statutory examinations of young persons) of one or more of the kinds indicated in 3	845	453	433	750	2,018	4,499
3. Kinds of medical services in the factories in 2						
(a) General medical supervision over health of employees, including study of sickness records, working conditions, and advice to the firm on questions of factory hygiene	230	137	223	418	1,517	2,525
(b) Supervision of first-aid or ambulance room services	261	145	220	391	1,494	2,511
(c) Periodical medical examination (whether compulsory or not) of particular groups of workers, e.g., those in employment with special health risks	545	297	200	311	921	2,274
(d) Periodical medical examinations of all workers						
(i) at the factory	27	13	20	50	119	229
(ii) at the doctor's surgery	4	1	4	3	6	18
(e) Examination of new entrants and applicants for employment						
(i) at the factory	76	71	124	253	1,034	1,558
(ii) at the doctor's surgery	76	17	20	32	80	225
(f) Examination of workers returning after illness						
(i) at the factory	46	46	83	184	800	1,159
(ii) at the doctor's surgery	68	7	11	21	34	141
(g) Other kinds except statutory examinations of young persons	48	36	69	119	465	737

The Medical Team in Industry

The medical team comprises doctors, nurses, assistant nurses and first-aiders assisted by administrative and clerical staff. At present it is estimated that about 700 doctors are employed full-time in industry and between 1,000 and 1,500 part-time. These are additional to the 1,700 Appointed Factory Doctors. State Registered Nurses number about 5,000 of whom 1,396 hold the Occupational Health Nursing Certificate of the Royal College of Nursing. No figures are available of the numbers of State enrolled assistant nurses and trained first-aiders but these are very considerable.

In 1951 the Association of Industrial Medical Officers published a booklet on the Functions of an Occupational Health Service. The term occupational was purposely chosen as signifying all forms of employment as opposed to industrial which is normally associated with work in factories. This book is out of print and at present a new edition is in preparation.

Government departments are among the largest employers of labour and set a pattern for private industry; examples are the medical services of the Post Office, Ministry of Supply and Atomic Energy Authorities. The Boards of the nationalized industries in their charter are required to provide medical services. These are exemplified by the transport, coal, electricity and dock labour services. Some details of the National Coal Board Medical Service will serve as an illustration.

Coal mining in Great Britain employs 680,000 men in about 818 pits. In 1958 the medical service comprised a chief medical officer, 79 medical officers, 379 nurses, 2,455 medical room attendants, and 21,214 certificated first-aid men. In addition to routine medical supervision special teams are engaged in periodical x-ray examinations and tests of pulmonary ventilation of all coal miners. Pneumoconiosis is the most important disease problem and since 1952 an intensive research project — Pneumoconiosis Field Research or 25 Pits scheme —has been in progress. This embraces medical and environmental investigations. The work is carried out in close cooperation with the Pneumoconiosis Research Unit of the Medical Research Council.

The Slough Industrial Health Service, which commenced in 1947, is a pioneer experiment in providing a comprehensive service for a centralized group of about 160 factories of varying size and production. A more recent experiment is in course of development at Harlow New Town. This again covers a large number of factories, but instead of a team of industrial medical officers as at Slough, the service is maintained by a group of local general practitioners working on *a rota* at and from a central industrial health clinic.

Government training, rehabilitation and sheltered employment services are supplemented by voluntary schemes notably in the motor and steel industries. Roffey Park Rehabilitation Centre deals with cases of indeterminate ill health, often the result of social or psychological maladjustment at home or at work. Local authorities provide excellent workshops for the employment of the blind.

Research is undertaken by the Medical Research Council, the Department of Scientific and Industrial Research, the Factory Inspectorate and Mines Inspectorate and universities and technical colleges. Private and nationalized industries also provide facilities to deal with their own immediate problems in associations for whole industries; outstanding examples of these are the British Steel Founders' Association, the Association of British Chemical Manufacturers, and the British Ceramic Research Association.

Instruction in industrial medicine is included in the teaching of undergraduates, while full and part-time courses leading to the specialist Diploma in Industrial Health are available for postgraduates at several universities and related institutes. The Royal College of Nursing and the Birmingham Accident Hospital provide courses for the Nursing Certificate in Occupational Health. Training of first-aiders is largely undertaken by the St. John Ambulance Brigade, the Red Cross, and St. Andrew's Ambulance Brigade.

A forum for exchange of knowledge and discussion is provided by the Association of Industrial Medical Officers, the Ergonomics Society and the Occupational Hygiene Society, all of which publish their transactions. Reviews of various aspects of the subject are presented in the annual reports of the Ministry of Labour and National Service, Ministry of Pensions and National Service and Ministry of Health. The Registrar General publishes in connexion with the Census a Decennial Supplement on Occupational Mortality. Popular education and propaganda in this field is carried out by such bodies as the Royal Society for the Prevention of Accidents (R.O.S.P.A.) and the Industrial Welfare Society. (I.W.S.).

It is now possible to examine the role of the various major health services in industry.

The Role of Statutory Services in Factories

The statutory services are a team effort in which the medical contribution cannot be assessed in isolation. The role may be summarized thus:

(1) Generally to promote safety, health and welfare; (2) to enforce certain prescribed standards of cleanliness — good housekeeping — heating, lighting and ventilation and personal hygiene; (3) to control hazards due to toxic chemicals, dusts and fumes; (4) to certify and supervise the fitness of young persons for specific jobs, and (5) to supervise thorough periodic medical examination the health of workmen employed in dangerous processes.

Critical Assessment

The system is too narrow in that it is restricted to persons employed in factories and does not include the even greater population of workers engaged in shops, offices, transport and agriculture. Relative to the large number of persons and factories, the number of inspectors is exceedingly small and they lack intradepartmental laboratory and clinical facilities. The inspectors can only enforce the minimum standards such as can be complied with by small factories. The examinations by the Appointed Factory Doctor are very limited in their scope and have frequently been criticized as cursory and of no value. Perhaps the most serious defect is that, in practice, the examinations of young persons are not integrated with the previous examinations in the School Medical Service.

Despite these criticisms the inspectors—medical and nonmedical—do make a positive contribution to safety, health and welfare and not only against industrial hazards but against all sickness.

The Role of the Voluntary Medical Services in Industry

The voluntary services are concerned with the prevention and control of accidents and diseases rather than with diagnosis and treatment. Immediate skilled treatment of accidents shortens the period of handicap and reduces complications. This is reflected in the great reduction in the sepsis rate following injuries, which has been achieved in recent years. As to the contribution to the health services, the skilled treatment of emergencies at work helps to relieve the load on the general practitioner and hospital outpatient clinics.

Preplacement and periodic examinations help the individual workman by ensuring that he is employed in work suited to his physical and mental capacity and is not endangered by it. Furthermore it is possible to re-able men while keeping them at work and to supervise the health of disabled and elderly workmen. To enable men to continue at work while injured or after retirement age is a notable contribution to the Health Services.

At a time when hospitals are finding difficulty in recruiting nurses in adequate numbers, criticism is not infrequently made of the employment of trained nurses in industry. The fact is that the nurse in the factory relieves the burden on the hospital. Moreover, many of these nurses are married and have domestic responsibilities or are themselves disabled and so would not be available for work in hospitals.

Summary

It is hoped that from this account of health services in Great Britain readers will appreciate that paradoxically while there is no Industrial or Occupational Health Service as such there is considerable organized practice — statutory and voluntary — of industrial health. The system commenced nearly 150 years ago. Progress has been slow but has been accelerated in the last 25 years. Merewether has pertinently commented on this cautious evolution that no step has been taken in advance of knowledge. Meanwhile, however, advances in the physical and chemical sciences and in methods of production and management have completely revolutionized the health problems of all workers of all grades. In this situation slow deliberate progression can no longer suffice; the need is for a bold vigorous advance into which the existing good but fragmentary services can be incorporated and consolidated. Fortunately the times are favourable. Sound foundations have been laid by the National Health Service, and existing statutory and voluntary medical services in industry, professional organizations and journals are well-established; teachers and teaching facilities, including a number of excellent textbooks, are available for training of industrial doctors. All political parties support the idea of an Occupational Health Service. At present attention is focused on the provision of hygiene laboratories on the American pattern, and an expert committee — the Industrial Health Advisory Committee set up in 1955 under the chairmanship of the Minister of Labour — is studying the problem comprehensively. The danger is that too much exploration may result in too little and too late action.

By a coincidence just as I had written this final sentence it was announced in television news that against the Government's advice a private member had succeeded in getting a Second Reading for the Offices Bill, which has as its purpose to fix minimum health, welfare and safety conditions in offices.

A New Look at ABILITIES INC.

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The story of Abilities Inc. is common knowledge. It is doubtful whether any company that still lacks three years of completing the first decade of its existence has received the international recognition accorded to this Long Island, New York, concern that makes complex electronic and mechanical components and assemblies.

Numerous publications and countless persons on the speaking platform have recounted the story of this young subcontracting company that has only physically disabled persons—from the president to the worker at the bench — on its payroll. The company's president has appeared before a Senate committee to explain the work of the organization.[1] And last year a book was published which relates the president's personal account of the founding and development of this firm which has grown from four employees in 1952 to 400 in 1960.[2]

Much of what has been told about this young company concerns the high morale and the productivity of the employees. But little attention has been accorded to certain physical and personnel problems peculiar to an organization manned entirely by persons with physical impairments. It is the detailed attention to such problems that has made it possible for the company to maintain high production and to achieve a safety record so excellent that its compensation insurance ratings have been consistently downrated.

Special Physical Arrangements

Management's opportunity to make its plant more physically functional for the employees came about three years ago when it moved to a new structure built specifically for the company.[3] Among special features are doorless telephone booths with wall instruments placed at a four-foot height; water fountains built in two sections, one 28 inches and the other 43 inches high; blackboards low enough for a seated person to use comfortably; and rest rooms with different entrances and exit doors.

The low wall telephones, the 28-inch-high water fountain (similar to those built for children), and the low blackboard are designed for the use of persons in wheel chairs or for those who have no legs yet do not wear artificial limbs or use wheel chairs. One of the individuals who uses a wheel chair is the vice-president and works manager who requires a blackboard when he meets in the seminar room with supervisors or with visitors from other companies and government agencies who visit the plant to observe and to hear the operations of Abilities Inc. explained.

Safety is Motivating Influence

Many of the specially designed features are considered safety precautions. Doors that are used for two-way traffic, for example, have glass windows so that upon approaching a door the not-so-sure-footed individual won't be caught off balance by someone unexpectedly opening the door from the opposite side. Most doors have automatic closing devices and all are wide enough to permit the passage of a wheel chair. When the large double doors that separate the packaging area from the manufacturing area are open, a buzzer rings continuously until they are again closed. This buzzer warns blind persons who are employed in the packaging area that the doors are open.

Because there is considerable wheel chair locomotion in the plant, it is important to have commonly used doors open easily and close automatically. There are no dual sets of doors (such

as might be used to enclose a vestibule). If doors have knobs, the knobs are of a type that can be easily turned by persons who wear prosthetic hooks for hands.

The plant is entirely without steps. Where there is an ascent or descent, ramps have been built with such gradual changes that most persons are unaware of any difference in elevation.

Rest Rooms and Parking Lot

Different entrance and exit doors are used in rest rooms to expedite and regulate wheel chair traffic. In these rooms, curtains instead of doors are used in the individual toilet compartments. The compartments are wider than standard booths and have steel bars fastened at the sides, which enable an individual to transfer himself safely from a wheel chair to the toilet seat and back again. The toilet bowls are installed at varied heights in different compartments to answer varying needs of handicapped individuals.

The mirrors and sinks in the washrooms are low enough to permit their easy use by very short persons and by those in wheel chairs.

Despite their physical handicaps, 70% of the Abilities employees drive their own cars. Many have had special devices built in the cars to permit their driving. For the employees' convenience, the parking lot is directly outside the two rear entrances of the plant. In the first row, which is reserved for drivers who use wheel chairs, the individual spaces measured off for cars are one foot wider than the space allowed for cars in other rows. This extra width permits an employee to get out of the car and into a wheel chair which a fellow worker brings from the plant. (In most cases, persons who use wheel chairs have one at the plant provided by the company and one of their own at home.)

Other Aspects of Safety

Besides the plant's physical features geared to safety, special precautions are also observed. Some, of course, are similar to those that might be adopted by any plant that is safety conscious. For example, plastic window guards have replaced metal guards on high-speed wire strippers because persons were continually taking off the metal guards to examine the work. Another precaution is the placement of extra guards around a wire cutter and stripping machine so that people who pass won't be hurt.

Good housekeeping at the job site is another safety factor constantly stressed by supervisors and is an important feature of employee merit rating.

An example of one special on-the-job safety precaution is the requirement that persons who suffer from Buerger's disease wear gloves to prevent infection through skin abrasions. Another rule requires that even persons with artificial legs wear safety shoes. This measure is designed to avoid damage to an artificial foot, which would be expensive to replace.

A new part of the safety program that will receive concentrated attention this fall is a fire brigade which will enlist the active participation of workers.

Wheel Chair Use Encouraged

In addition to the plant's physical features designed to accommodate the severely crippled worker and the person in the wheel chair, attention is given to on-the-job factors that concern these people.

For example, it is considered safer for some workers to use wheel chairs although they may be accustomed to moving about on crutches. A foreman who uses a wheel chair explains this situation as follows: "Some of us could use crutches instead of wheel chairs when performing our jobs. But walking on crutches is more hazardous and more tiring, and the fatigued worker is a promising candidate for an accident. So despite the initial dislike of some workers for discarding their crutches for the wheel chair, we have convinced them of the greater safety value in doing so."

Adapting the Worker to the Job

Hydraulic wheel chairs are now being used experimentally at Abilities. Such a chair permits a person to raise and lower himself to different work heights. Actually this is one means Abilities uses to adapt the worker to his job. Abilities emphasizes that correct posture and correct height of the work operation cut down on worker fatigue and, consequently, are safety precautions. For this reason, persons who are seated while working — such as those who operate machines that debur and polish gyroscope parts — have chairs adjusted to their individual heights. The disability of a young girl who operates a coil winding machine prevents her from sitting far enough back on a chair to use the back rest. So that she would not suffer back fatigue, her supervisor had the back of the chair moved to a position eight inches from the front so that she is able to rest against it.

There are many examples at Abilities of how workers have adapted their limitations to the job and yet not created conditions that could be hazardous to themselves or their fellow workers. Examples of some of these cases are included in a report published by Human Resources Foundation, the research unit of Abilities Inc.[4] Here is one that concerns a spinning operation.

"Job Description: Spinner. Operates a lathe on

which shaped articles are spun from sheet-metal stock. Clamps disk to spinning form mounted on headstock spindle by forcing the follow block against the disk with tailstock. Starts machine. Coats outside of rotating disk with beeswax. Manipulates a form tool by hand against the disk, forcing it to the shape of the spinning form. Smooths and trims spun piece with hand tools. Removes completed part from the machine.

"*Problem:* Duties usually involve 'walking, prolonged standing, pulling, hammering, bending, and lifting 25 to 50 pounds.' Can this job be performed by a person who is confined to a wheel chair?

"*Technical Information:* The machine used is a spinning lathe with a 22 inch swing.

"*Comment:* Although it is customary for a person to stand while operating a spinning lathe, it was found that, with a machine of standard height, light metals could be spun easily and effectively by an operator seated in a wheel chair. The lifting requirements quoted above were found to be greatly in excess of the practical demands of this job. However, since this worker, like most paraplegics, has highly developed arms and shoulders, lifting of weights within the above limits would present no problem, especially with the work and tools maintained at bench height."

Adapting the Job to the Worker

Like many employers whose handicapped workers represent only a small segment of their labor force, the management of Abilities prefers adapting the worker to the job rather than making radical changes in job operations to fit the worker. Nevertheless, the company has found that minor changes in job requirements often permit a handicapped worker to do the job satisfactorily and they can be made without violating safety rules. In fact, a report by Human Resources Foundation points out that just as the disabled worker has adapted his own physical limitations to the job complexities, so should management exhibit a parallel flexibility in its thinking. The report reads: "The total experience of Abilities Inc. to date has adequately disproved a common belief — unfortunately still prevailing in industry — that the worker and the job are to be considered as fixed quantities, incapable of being changed. One has only to trace the history of the industrial revolution up to the present era to realize that both quantities have been, and still can be, changed to reach the continually increasing goals of production. This is especially true in the adaptation of the disabled worker to the job and vice versa.

"The frequent inflexibility of management in this respect can in many instances be traced to a certain illogical adherence to traditional concepts in the fields of engineering and medicine which guide industrial policy. These traditional concepts are based primarily upon opinion, and have been disproved rather than verified from the observations and findings of this study.

"If we first consider the field of engineering, we find that certain basic machines, the prototypes of which are still in use, were originally designed primarily to perform a certain function or series of functions. However, ease of operation and such factors as the safety and comfort of the operator were rarely incorporated in the design.

"Today, these same machines may have been modified by the addition of minor technical improvements but the conventional disregard for the worker still remains in the design. Even modifications designed for the safety of the operator are often only introduced as optional accessories to the basic machine or when they are prescribed by regulations. . . ."

Among minor job adaptations at Abilities are the placement of a drill press on a table so that part of a wheel chair can fit under the table and a worker can operate the press from wheel-chair height. Similar adjustments have been made with lathes and grinders. Sometimes machine controls have been changed from hand- to foot-operated mechanisms.

Human Resources Foundation has written descriptions of some job changes that can be made without violating safety rules. The following is one that concerns a change from a two- to a one-hand operation, with the latter considered even safer than the original two-hand job.

"*Job Description:* Solderer (6-95.001). Joins metal parts together by melting and applying solder (low-melting metal alloy); holds the pieces to be soldered. Aligns parts in proper position and applies the hot soldering iron at the appropriate joints. Heats surface until solder works (sweats) into joints.

"*Problem:* This job usually requires a worker with both hands intact in order to hold, turn, and manipulate the work. Can these operations be performed by a person with a missing hand?

"*Adaptation:* The solution was simple. It was found that a person wearing a prosthetic hook could perform the job easily by using a holding fixture which was constructed to hold the work during the soldering process. The soldering iron itself had a thick padding of black tape on it so that the iron could be held firmly in the prosthesis.

"*Technical Information:* The holding jig in this case was made of aluminum. It was mounted on a plywood base. One end of the jig was so

constructed that one end of the part to be soldered could be inserted into a hole at the end of the jig. The opposite end of the jig had a slotted clip so that the work could be held firmly but at the same time snapped into and out of place very quickly.

"Comment: The use of holding fixtures for a job such as this is by no means unusual. In this case it enabled a 'one-armed' worker to do a 'two-armed' job. It should be added that the danger of accidental burns from the soldering iron is much less when a prosthetic device is used. This type of jig also results in a higher degree of safety in operation by a nonhandicapped worker, along with an increase in production. Also there is less fatigue and more freedom of movement for the worker."

The Plant's Safety Record

Some companies hesitate to employ handicapped persons because of the fear that they will cause accidents or injure themselves and consequently raise compensation costs.[5] Because of this often-voiced opinion, the record of Abilities Inc. is significant. Each year since its founding, the company's compensation insurance ratings have been lowered. Here is the record for the years since 1953:

1953-1954	downrated 21%
1954-1956	downrated 27%
1956-1957	downrated 39%
1958-1959	downrated 52%

In 1959, however, there was a 5% reversal and the figure changed to 47%. This is causing everyone to be even more safety conscious in 1960.

This record is especially noteworthy when one considers the hiring procedure of the company. A prospective employee is never given a preplacement examination. Although a paraplegic's handicap is readily apparent to the employment interviewer, his weak heart or diabetic condition may not be.

Nor is a person tested for aptitudes. His hiring depends primarily on his job motivation. Does he really *want* to work? And this motivation, according to placement personnel at Abilities, is easily detected. If a person wonders, at the interview, how he will get to work, whether he will become too fatigued on the job, etc., and does not exhibit determination to get and hold a job, he doesn't show desirable motivation. And if he is brought to the company's employment office by a social worker, it may be the social worker and not the applicant who has the motivation, according to the placement officer. Tests carried on by Human Resources Foundation and the psychology staff of a Long Island college show a high correlation between positive attitudes, good job performance and low absenteeism.

The absence of a preplacement examination does not indicate that the company lacks on-the-job medical services for its employees. On the contrary, once a person is on the payroll, he is put on a schedule of periodic physical examinations, and the part-time doctor and nurse help him to adjust to the job and keep a watchful eye on his disabilities to make sure nothing in his job operation will be hazardous to his physical well-being.

The medical personnel also keep employees apprised of scientific advances that may correct their handicaps. For example, in one unique case, information given to a fifty-year-old woman, blind from birth, resulted in an operation that permitted her to see her children and grandchildren. Arrangements for the operation (which was paid for by the worker) were made by the medical personnel. Another case of advice to a 22 year old veteran of dystonia (a disease marked by involuntary contortions of the muscles of the trunk and extremities) resulted in an operation that greatly improved his condition.[6]

Safety Consciousness Developed

Handicapped workers generally have good safety records.[7] And the management at Abilities believes that most handicapped persons have a greater tendency than other workers to be cautious about performing actions that could mean further damage to their handicapped state.

However, as far as Abilities is concerned, its good safety record is not just a fortuitous occurrence resulting from workers' innate safety consciousness. Everyone from the company president to the first-line supervisor sees to it that employees are made safety conscious. And an employee soon learns that careless safety habits figure prominently in his merit rating.

According to management, a job injury is seldom the result of an accident. It is not a chance occurrence but an incident resulting from an unsafe condition that could have been foreseen. And an Abilities employee is expected to absorb that philosophy.

Maintaining High Productivity

Hand in hand with Abilities' program to provide a safe place to work and to instill safety consciousness in its employees are management's efforts to motivate employees to maintain their high productivity rate. As one executive points out: "A person's disability does not make him an employee without the usual human faults. Like most other workers, we who are handicapped often need to be prodded to produce well and we need to be reminded about the importance of

safety awareness. Handicapped people gripe just like other people. But griping does not indicate that a person is uncooperative."

One device introduced recently to prod workers into better production is a departmental rating system. Over each department throughout the building one sees a large sign with one or two single letters of the alphabet. These letters represent a rating code that is explained to the workers by their department supervisors but is not understood by a plant visitor. Therefore, an A over one department does not necessarily mean that department has the highest production rating, nor would a Z indicate it has the lowest.

There are several reasons for the code. For one thing, workers need not be embarrassed before plant visitors about low ratings. In addition, the code eliminates the chance of a customer's worrying when he sees a Z over the department chiefly responsible for getting out his order.

Important in the production record, of course, is the department supervisor. Top management at Abilities devotes a great deal of time to supervisory training and conferences and is constantly on the watch for employees who show marks of leadership. The supervisors are consulted on all issues and participate in making up their own agenda for the supervisory conferences.

Other Reasons for Good Record

Although the company continues in its efforts to motivate employees to maintain their efficiency, the employees themselves have an ever-present and underlying spirit of willingness and eagerness to do their jobs well. This spirit comes from a mutual sharing of a common misfortune and from their gratitude at being given a chance to earn their own living. They may need stimulation now and again but a basic cooperative spirit is already present.

Life has been made happier for Abilities' employees in additional ways to taking home a pay check. Just as the plant's architectural layout was planned without steps and with other special features to make life simpler and safer for the disabled person, so too has attention been given to other needs of the individual. An example is the installation of a dental chair in the medical department so that an employee can make an appointment during his lunch hour, before work, or after work with a dentist who has agreed to come to the plant.

This arrangement was initiated by the medical department after the doctor and nurse discovered that many employees had poor teeth. A primary reason for this poor oral health, it was found, is the difficulty encountered by many handicapped persons in getting to dentists' offices.

For the same reason, many handicapped persons are unable to get to a church. This situation was remedied when a chapel was built in the new plant. This nineteen by twenty foot chapel has folding doors at the rear which can be opened for larger groups on special religious festival days. Rabbis, priests and ministers come to the plant to conduct services.

A new $500,000 wing is being added to the plant as a center for recreation, research, and rehabilitation.[8] The center will include a therapeutic gymnasium and a therapeutic swimming pool, a library, classrooms, a music room, an art room and hobby shop, a laboratory, meeting rooms and offices. These facilities will also be available to employees and other disabled persons in the community after hours and on week ends. The research and teaching program will be under the direction of the Human Resources Foundation.

The Quit Rate

The efficiency of Abilities' workers is demonstrated in the company's monthly quit rate. About two persons per month leave their jobs at Abilities because they become proficient enough to get work at other companies. Their reason for leaving usually is to find a working location more convenient to their homes.

And how does Abilities management regard this situation? The reaction is mixed. They are glad to see the basic premise of their enterprise justified — that if given a chance a handicapped person can support himself in the business and industrial world. But they are sorry to lose good workers. Their operation, too, is a business venture that must meet customer demands.

Has Confidence of Business

Evidence of the good records achieved by the company is apparent in the faith which business leaders in the community have shown in the enterprise. The two year old building was financed by: (1) a $300,000 mortgage reduced at an average rate of $20,000 per year; (2) a $345,000 debenture issued at 5% interest rate, redeemable at $30,000 per year (the first year's redemption was met on time with interest; the second payment is not yet due); (3) a $138,000 short-term note (recently paid off in full). Amortization of the mortgage is expected in less than 15 years. Meantime Abilities personnel jokingly say their mortgage must be the highest on Long Island (for the size of the company and plant).

The Facts About Abilities' Production

Abilities Inc. is set up under New York State laws as a nonprofit corporation, but it is operated as a full-fledged business that must meet the pro-

duction schedules of its customers if it is to remain in business. The company cannot afford to have workers absent from the job because of injuries or have workers produce at low efficiency any more than any other company that has production schedules to meet.

The company is not run sentimentally; it does not have and does not expect to have its customer relations based on sentiment. The blue chip companies that subcontract work to Abilities expect and receive their orders on time and in first-rate condition.

In the 1958-1959 fiscal year, the company's 400-odd workers produced more than $2,100,000 worth of business and earned more than $1,200,000 in wages. To keep these workers on relief rolls in that period would have cost the public an estimated $660,000 or more.

In its seven years of operation, the company has experienced only one layoff. That was in 1958, and the 60 workers who were laid off were rehired within a few weeks. All employees are paid wage rates that prevail in the community.

References

1. Henry Viscardi, Jr. described the operations of Abilities Inc. when he testified before the Senate Finance Committee in 1956 in connection with the proposed legislation to lower the Social Security eligibility age to 50 for disabled persons.

2. *Give Us the Tools*, by Henry Viscardi, Jr., Eriksson-Taplinger Company, Inc., New York, 1959.

3. The company started its subcontracting operations in a garage converted to a workshop. Expansion has been achieved through the profits the company has earned.

4. "Human Resources Study Number 3, A Study of the Adaptability of Disabled Workers," by William J. Campbell, Raymond R. Leizer and Harold E. Yuker.

Human Resources Foundation is a division of Abilities Inc. that is organized to carry on research about disabled persons working under competitive conditions and to disseminate this information by teaching seminars, conferences, and demonstrations. Human Resources Foundation is supported by grants whereas Abilities Inc. earns its way. The report series being published by Human Resources Foundation are financed by special grants designated for that exclusive purpose and are available from Abilities Inc.

5. "The Company and the Physically Impaired Worker," *Studies in Personnel Policy*, No. 163, National Industrial Conference Board, points out that this opinion is refuted by many companies that employ handicapped persons as well as by insurance companies.

6. Medical research studies are made on the effects of various work operations on different types of handicaps. Reports of the studies are available from the director of medical research, Alvin Slipyan, M.D.

7. See "The Company and the Physically Impaired Worker," *Studies in Personnel Policy*, No. 163, National Industrial Conference Board.

8. This wing will be completely independent of Abilities' manufacturing operations and will be financed by private grants.

Hypnosis Via TV

Televised hypnosis demonstrations can trigger serious emotional reactions, the American Academy of General Practice warns. The Academy's Commission on Public Policy added that hypnosis, like dynamite, is useful when properly employed, dangerous in the hands of amateurs. Dr. Paul Read, Omaha, Neb., chairman of the commission, said that closed-circuit studies, conducted by the British Broadcasting Corporation, have shown that viewers thousands of miles away can be hypnotized while watching TV demonstrations. The victims, Dr. Read added, may later require corrective psychotherapy.

The Academy urged that medical associations and national television networks establish ground rules to eliminate television trance inductions. In addition, the commission recommended that hypnosis not be used for entertainment purposes and that it not be mentioned or regarded as the answer to common emotional problems.

Dr. Read pointed out that hypnosis must be considered a psychiatric tool and only a part of total psychiatric care. He also deplored the current parlor hypnosis fad. "Every time a magazine article or a television program rekindles public interest, I have patients asking me to hypnotize them and cure headaches, allergies, arthritis and domestic or marital problems," Dr. Read said. "These people have been led to believe that hypnosis is a glorious panacea, a wondrous cure-all that instantly solves any physical or emotional problem. Such articles and programs rarely leave any other impression."

Only people who have had adequate special training at accredited schools or universities should attempt to induce a hypnotic trance and even they should do so only when use of the technique is clearly indicated, Dr. Read pointed out.

Mr. Mac F. Cahal, executive director of the Academy and publisher of *GP*, said the Academy's official publication had warned in recent articles of a new cult in hypnotism. One article, written by Dr. G. Wilse Robinson, Kansas City psychiatrist, said unsupported and unscientific claims were being made for hypnosis as a therapeutic measure and that unqualified practitioners — even dentists — were using the technique.

Selection and Placement of the Handicapped Worker

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  Research Director
- WILLIAM J. CAMPBELL and
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The plant physician who has to deal with disabled workers is apt to have many questions about the psychology of such workers. In what ways are they similar to, and in what ways are they different from nondisabled workers? Do they have to be treated differently? Do they present any special psychological problems?

Too often answers to such questions are based on assumptions rather than fact. It is so easy to assume that the disabled worker is different, that he will present special psychological problems, and that he must be treated differently. Yet the facts are quite different from the assumptions. If there is careful selection in hiring disabled persons, then the disabled employees will behave no differently from the nondisabled ones. They will expect no special treatment, and will present no special problems. But who should be hired? What criteria can be used in selecting disabled employees?

Most industrial organizations use a number of selection devices to screen all applicants, physically normal as well as handicapped. These may include physical examination, psychological tests, interviews, and other devices such as application blanks, letters of recommendation, etc. All of these techniques are designed to select those persons most likely to make a maximum contribution to the organization. Each of the techniques presumably screens employees on slightly different criteria, but there is some degree of overlap in purpose. For example, psychological tests aim primarily at determining whether the individual has the requisite skills or potential skills and/or certain desirable personality characteristics. Application blanks usually represent a supplement to the personal interview in learning the individual's past experience and training, while letters of recommendation may supplement psychological tests in gathering information on personality characteristics of the individual, and provide other data to support or deny the subjective feelings of the interviewer about the personal character of the applicant. No selection device is infallible, and for that matter many have come under rather strong attack from some quarters; e.g., Ghiselli and Brown (1955) attack the use of letters of recommendation and interviewing as it is carried on at most organizations.

What seems of crucial importance is that in many cases, little or no attempt to evaluate the success of the device is carried out. Which of the techniques are valid selection devices for the physically handicapped? More specifically, since the medical director is concerned primarily with the use of the physical examination as a selection device, the question arises, is the pre-employment physical examination a valid selection technique, at least for use with the physically handicapped? In order to answer this question, we must first list some of the functions served by the pre-employment physical when it is used as a selection device. This distinction is intended to contrast this use of the pre-employment physical from its use in protecting the company from legal suit arising from questionable claims for disability payment, when an employee states his health has been impaired by the job.

As a selection device, the feeling exists that the pre-employment physical can (1) aid in selection by eliminating potential employees who will not be productive as a result of excessive absences due to illness or physical disability, (2) aid in selection by screening out those applicants whose physical disabilities make them likely to be "accident prone," and (3) determine whether a candidate possesses those physical characteristics necessary for the job, or, conversely, possesses a disability which might prevent adequate job performance.

Those are some of the aims of the pre-employment physical. Normally we think of the medical department performing such an examination. It is undoubtedly true, however, that in many cases the nature of a person's physical condition is so obvious that the screening is done by someone in the personnel department who knows that the subject would certainly not be able to pass the medical department examination.

Many of these concepts have high face validity. That is, they appear reasonable. In science, however, we know that what appears to be logical sometimes runs contrary to fact. Logic has been defined as the science which proves that the world is flat. Every so often it is important to re-examine even the most basic concepts, preferably through some technique other than reason.

For example, to determine whether pre-employment screening is accomplishing the ends we set for it, it would be desirable periodically to eliminate or change the procedure for a period of time and note the results. Another less drastic approach would be to determine what happens in companies that do not use these screening devices. While it is obvious that such companies might not resemble one's own corporation, an analysis of the problem might throw some light on the answers to the questions implied above. If we were to find a company that not only eliminates the screening procedures, but additionally limits its hiring practices by employing only those persons who could not pass the average pre-employment physical examination given by other companies, we would be in a position to draw interesting conclusions about the efficiency of the technique, at least as it applies to the aforementioned goals.

Just such a natural laboratory as that described above exists. The corporation which meets these criteria is known as Abilities Inc., and is situated in Albertson, N. Y. At Abilities there has been a good deal of research carried out dealing with the employability of the handicapped worker. Before looking at the results of this research, it might be helpful to describe Abilities.

Abilities Inc.

Abilities Inc., is a manufacturing plant that does subcontracting work for various companies.[1] It employs approximately 400 persons, all of whom are severely disabled. Many of them have more than one disability. Its employees have such disabilities as polio, cerebral palsy, paraplegia, epilepsy, and visual and auditory defects. Many lesser known disease entities, including progressive diseases are also represented. There is no pre-employment physical examination of any kind. Employees are not preselected; they are sought through the usual employment channels.

Except for the fact that all of its employees are disabled, Abilities is the same as any other manufacturing plant of its size. Wages are competitive with those in other plants. Contracts are obtained through competitive bidding. Working conditions are typical of those in most industrial plants. All equipment is standard industrial machinery with, at most, minor modifications. A 40 hour week must be put in by all employees. Under these competitive conditions, Abilities has been successful. Since its start in 1952, it has grown from a work force of five, to approximately 400 employees in 1959. Its physical plant has grown from a 2,000 square foot garage to a 40,000 square foot air-conditioned plant. Its assets have grown from an $8,000 loan in 1952 to a gross business of approximately $2,000,000 in 1959. This growth serves as concrete evidence that the handicapped worker can be employed successfully in competitive business and industry.

Closely connected with Abilities is its subsidiary known as Human Resources Foundation (H.R.F.). H.R.F. engages in teaching and research in three major areas: medical research, psychosocial research, and bioengineering research.[2] The research centers around problems relating to the employment of the physically handicapped, while the educational program is centered around the dissemination of information relating to such employment. In an attempt to carry out the educational task, H.R.F. conducts seminars and tours of the plant for interested persons in industry and medicine. During 1959, a total of over 4,000 people toured the plant. Although H.R.F. operates as a division of Abilities, its research program is completely independent of the manufacturing operations, except for the fact that all of the Abilities employees are subjects in the research program.

The present paper will discuss each of the variables suggested earlier and see how they apply at Abilities, namely: absenteeism, safety, and job requirements.

Absenteeism

It is conventionally assumed that through the use of a pre-employment screening, individuals who are likely to have relatively high absence rates can be identified. It is felt that disabled persons, for example, will more often feel too ill to work. They may require more medical attention and have to go to the doctor more often. They are more likely to be unable to attend

[1]The full story of Abilities Inc. has been told in *Give Us the Tools*, by the president and founder of Abilities, Henry Viscardi, Jr. Taplinger Pub. Co., New York. June, 1959.

[2]SLIPYAN, A., Abilities Inc. Medical Research Program, *Human Resources Study Number 1*, Human Resources Foundation, Albertson, N. Y., 1958.

YUKER, H. E., TAYLOR, E. J., VISCARDI, H., JR., The Disabled Workers at Abilities Inc., *Human Resources Study Number 2*, Human Resources Foundation, Albertson, N. Y. 1958.

CAMPBELL, W. J., LEIZER, R. R., YUKER, H. E., A Study of the Adaptability of Disabled Workers, *Human Resources Study Number 3*, Human Resources Foundation, Albertson, N. Y. 1958.

work in inclement weather. By selecting only those who can pass a rigorous physical we can therefore select those who will be likely to have the best attendance records. Statistics collected at Abilities show that attendance records are superior to those prevailing in industry. For example, Abilities employees have an average of 1.2 days of absence for every 100 working days, as compared with 3.1 days per 100 in industry.

Safety

Another reason for requiring that a prospective employee meet certain medical standards is that it is assumed that those who are not capable of meeting these standards will be more likely to have accidents. Thus, a person on crutches, it is assumed, may be likely to slip and fall; a cerebral palsied individual may lurch forward into a machine.

Safety is certainly of vital concern to the medical director, yet there is a real question as to the identification of the safe worker. Is it the individual who is turned down by either the medical department or the personnel department for physical reasons?

Using Abilities as a laboratory, we find that in a seven year period with a work force that is, at present, over 400, there have been only four compensable accidents, one of which was a bee sting. In each of the four cases, the accident was unrelated to the disability. As a result, the insurance premiums paid by the company, based on experience credit, are less than one-half that paid by more conventional companies in the same field of the same approximate size.

Job Requirements

Often it is the function of the physical examination to determine whether an individual possesses the physical characteristics necessary for the performance of the job for which he is being considered, or whether he possesses any disabilities which might interfere with successful job performance.

Evidence on this point, from H.R.F. research, suggests that in many cases the physical requirements established for the job are not realistic. This can best be demonstrated through the use of case studies. For example, the U. S. Department of Labor lists the physical characteristics required for over 4,000 jobs. As one small example, the job of chief electrician, according to the government publication, requires manual dexterity, finger dexterity, and eye-hand-foot coordination. This job is successfully performed by a man whose left hand has been amputated at the wrist, and who has only his thumb on his right hand. In addition, he is totally blind in one eye and has 20/70 non-correctible vision in the other eye. Apparently, either the job requirements for this job are unrealistic, or the individual has learned to perform using compensatory techniques. In either case the pre-employment physical would be an inappropriate technique for determining his employability for the job in question.

Implications

In most companies the medical director's position carries with it a great deal of status. He is the company expert on matters relating to the physical well-being of the employees. In the pre-employment physical examination he is called on by management to fulfill several goals. The present authors feel that in this capacity he is in a position to advise management as an expert consultant on problems of physical conditions. Based on the information available through research at Abilities, which appears consistent with the literature on the disabled worker, he is in a position to communicate ideas to management concerning the concept of physical disability. He can suggest, for example, that: (1) management must re-examine the concept of disability. Specifically, they must decide whether the terms physical disability and job disability are synonymous; (2) management should examine the role of the pre-employment physical in screening out workers, even when considering the individuals tendency to be "accident prone." There is evidence that the examination may be selecting out those persons with good safety records, and rejecting them for employment; and (3) the medical director should be cautious in ignoring too many of the implicit assumptions regarding the physical characteristics required by various jobs. As medical director, he can point out the extent to which a given disability is actually disabling.

Management looks to the medical department to assist them in selecting the best employees for a job and eliminating poor risks. Abilities has shown that it can thrive in a competitive market by employing the physical rejects of other companies. Most disabled persons who fail to get jobs with the average company never even get as far as the pre-employment physical. In effect, someone in the personnel department performs his own pre-employment physical. The medical director is in a position to present a case against this practice in the interest of accomplishing some of the ends intended for the formal pre-employment physical.

the ABOVE KNEE AMPUTEE

• ALVIN SLIPYAN, M.D., F.A.C.P.
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I am especially pleased to be able to write this foreword to the timely material which Dr. Slipyan has prepared as part of our research program.

I have been convinced for some time that the cause of the disabled workingman who seeks employment can best be served by more intimate knowledge of his needs and of his nature. A great many of the obstacles to employment exist because of a lack of knowledge of the capacities of the disabled individual and his ability within these capacities to meet the demands of a good job.

I know a great deal about the problems of amputees since I have lived with artificial limbs for most of my life. As I grow older I am beginning to discover that at the end of a busy day I find great comfort in taking off my limbs and spending my time at home, at dinner and with my family, in a wheelchair.

In the industrial environment we have observed that especially in cases of bilateral above-knee amputees, quite frequently the worker, at his job, is better off in the wheelchair since he becomes less fatigued and therefore is more efficient during the working day. There is always, of course, the consideration that if he is less tired when he leaves his work he has greater reserves of energy for his extracurricular life, which he can always enjoy on his artificial limbs if he wishes.

We have had many instances at Abilities Inc. of above-knee amputees, both unilateral and bilateral, who have used their artificial limbs to drive their cars in coming to work but have taken off their limbs and performed their work tasks in wheelchairs during the work day. It seems like a good program, and while it may not be entirely consistent with some concepts of medical rehabilitation, if it is beneficial for the individual and allows him to do a better day's work we have always gone along with it. In fact, in many instances we have sincerely recommended it, as we have for paraplegics who can ambulate with crutches and long leg braces.

Human Resources Foundation, as the research and teaching arm of Abilities Inc., will continue to publish material such as this, predicated on its continuing program of research which has been sponsored by interested individuals, foundations and government agencies. It is our hope that this continuing accumulation of knowledge will enhance the opportunities of disabled individuals to find a productive place in our society and will allow an increasing number of employers to find deserving workers among this group.

—HENRY VISCARDI, JR.
LL.D. (Hon.) L.H.D. (Hon.)
President
Human Resources Foundation

The loss of part of the body, be it a finger, toe, arm or leg, comes as a tragic blow to the mature adult. After a period of re-evaluation with the help of experienced counselors, the individual once more begins to look forward to a course of training and perhaps a field of endeavor in which he may, in spite of his handicap, attain success. These handicapped people are fortunate indeed if they receive proper guidance and physical rehabilitation, but the present facilities are far from adequate and many are left to readjust their lives with only a token amount of training.

It is estimated that one out of every 700 persons has a major amputation[1] and the number who have received proper guidance and care is only a fraction thereof. The above knee amputee is the most common surgical amputation and usually presents the most difficult rehabilitation problem.[2] This rehabilitation is achieved only when the planned personal, social, home, and vocational objective is attained. Through the Office of Vocational Rehabilitation and through work estimation units, a concerted effort was begun to gainfully employ these people.

In April, 1956, the Institute for the Correlation of Physiology with Therapeutic Exercise, in Oklahoma, stated that in many instances excessive workloads imposed on patients who had had poliomyelitis produced harmful results ranging from psychological anxiety to gross evidence of adrenocortical dysfunction of a type which has been associated with stress.

Dr. H. J. Ralston, at the University of California, San Francisco, supervising an energy study group to evaluate energy study in lower extremity amputees, places these amputees in the same category as the person who has suffered poliomyelitis, a vascular accident resulting in paralysis, cerebral palsy, or any debilitating disease or injury to the extent that he is unable to carry out easily and efficiently a workload which can be so carried out by the normal person. Passmore and Durnim[3] have given accurate and systemic information concerning the energy requirements of the normal subject. Muller and Hettinger[4] showed that the lower extremity amputee had an energy expenditure in most activities approximately 100% greater than the non-handicapped, except while sleeping or sitting.

CLASS 1 — TABLE I.

Employee Age-Sex Marital Status	Unilateral or Bilateral	Length of Stump from Anterior Superior Iliac Spine	Type of Work	Ambulatory or Wheel Chair	Age at Time of Accident	Amount of Re-habilitation
J. R.-39 M — Married	Bilateral Rt. - A/K Left-B/K	Rt. — 13¾ in. Left — 18¼ in.	Foreman — Harness and cable assmbly-sitting.	Wheel chair, some walking with prostheses on both legs, No crutches	27	one year in Army
V. K.-35 M — Married	Bilateral	Rt. —8¼ in. Left — 8¼ in.	Foreman — Harness and Cable — sitting	Uses left artificial limb and crutches. Wheel chair at work	21	6 years
F. H.-47 M — Married	Bilateral A/K	Rt. — 15 in. Left — 18 in.	Deburring	Ambulant — No canes or crutches	18	None
L. B.-30 M — Married	Bilateral Rt. - B/K Left-A/K	Rt. — 2 in. Left — 13½ in.	Production Supervisor	Wheel chair	22	None
S. M.-44 M — Married	Unilateral	Left — 12¾ in.	Bench work	Uses artificial limb constantly	39	None
E. G.-50 M — Married	Unilateral	Rt. — 10 in.	Riveting	Uses artificial limb constantly	10	None
L. L.-35 F — Married	Unilateral	Rt. —13½ in.	Coil winding Sitting	Uses crutch, no limb	8	None
R. K.-20 M — Single	Unilateral	Rt. — 22 in.	Inspection	Ambulant — artificial limb	17	None Self-taught
S. G.-42 M — Married	Unilateral	Rt. — 17 in.	Inspection	Ambulant — artificial limb	29	None
M. F.-35 M — Married	Unilateral	Left — 8 in.	Material Control Clerical	Ambulant — artificial limb	28	None
W. D.-30 M — Separated	Unilateral	Rt. — 14 in.	Mechanical	Uses artificial leg constantly	23	1 year
D. A.-22 M — Married	Unilateral	Left — 12 in.	Harness Assembling	Uses artificial leg, Ambulatory	6	None
Wa. B.-62 M — Separated	Unilateral	Rt. — 12½ in.	Inspector	Uses artificial leg constantly. No crutches or cane	32	None
W. F.-35 M — Married	Unilateral	Left — 8 in.	Harness Assembling	Uses artificial limb most of the time	21	None
J. D.-44 M — Single	Unilateral	Left — 2 in.	Coil winding	Walks with 1 crutch, sometimes 2 crutches. Does not use artificial leg.	5	None
C. A.-28 M — Married	Unilateral	Rt. — 14½ in.	Packaging Foreman	Uses artificial leg constantly	23	None

Many methods have been devised to study energy expenditure relating to work and whether the workload of a given subject is within or exceeding his limits of endurance. (Oxygen consumption studies during work, systemic dietary analysis, pulse rate studies, pulmonary ventilation measurements, and work effect on general health are some of the modalities employed.) Our study deals with the occurrence of industrial fatigue as determined by an evaluation of the effect on general health, productivity, absenteeism, compensable accidents, and development of physical complications.

An on-the-job study to determine the productivity, maneuverability (type of work), reliability, motivation, and accident rate has been done at Abilities Inc. on 24 amputees. A general health study relative to the etiological factor and sequellae has been integrated with the above industrial evaluation.

The amputees have been divided into three groups—

1. TRAUMATIC (16 employees)
   Bilateral - 4 Unilateral - 12
2. DISEASE
   (a) Infectious (1 employee)
   (b) Vascular (3 employees)
   (c) Neoplastic (3 employees)
3. CONGENITAL (1 employee)

Class I — Tables I and II

Of the 16 traumatic A/K amputees listed in Class 1, Tables I and II, four of these are bilateral and two use a wheel chair constantly at work. In a total of eight years of employment, there have been only 25 days absenteeism in this small group. In the remaining 12 unilateral amputees, there were 77½ days absenteeism in 24 years of employment. The average age of the bilateral group was 37¾ years, while the average of the unilateral amputees was 37¼ years. Of the entire group, the average age at time of amputation was 20½ years. Only four amputees have had complications while employed and the most serious was D. A., who developed recurrent boils around stump and buttocks which cleared when the employee was put in a wheel chair and given antibiotic therapy.

Travel to and from work was by automobile either as a rider or driver and the average traveling time, both ways, was one hour. The compensable accident rate was zero. The activity pattern varied from sitting occupations to active, constant walking. The length of the stumps was no factor in developing complications nor increasing the absenteeism. Rehabilitation training was defined as having received instruction and training in a hospital or clinic in the use of the

CLASS 1 — TABLE II.

Employee Age-Sex	Date Employed	Complications Since Employment	Absenteeism	Travel Time Distance	Mode of Travel	Compensable Accidents
J. R.-39 Male	March, 1956	Occasional "corn" on stump	5½ days	25 min., 15 mi.	Drives	None
V. K.-35 Male	Dec., 1955	None	None	20 min., 5½ mi.	Drives	None
F. H.-47 Male	April, 1955	None	6 days	45 min., 20 mi.	Drives	None
L. B.-30 Male	April, 1954	None	4 days	20 min., 14 mi.	Drives	None
S. M.-44 Male	Oct. 1, 1958	None	None	1 hour, 35 mi.	Drives	None
E. G.-50 Male	March, 1956	Stump sores, healed area of ulceration	4 days	¾ hr., 15 mi.	Drives	None
L. L.-35 Female	Jan., 1959	None	4 days 6 wks. L.O.A.	25 min., 15 mi.	Car pool	None
R. K.-20 Male	Jan., 1959	None	None	45 min., 25 mi.	Drives	None
S. G.-42 Male	April, 1954	None	8½ days	25 min., 15 mi.	Car pool	None
M. F.-35 Male	1953	None	12 days	50 min., 35 mi.	Drives	None
W. D.-30 Male	Sept., 1958	None	8 days	30 min., 20 mi.	Drives	None
D. A.-22 Male	Sept., 1958	Recurrent boils around stump area and buttocks	1 day 2 hrs.	30 min., 15 mi.	Drives	None
Wa. B.-62 Male	Dec., 1958	None	None	30 min., 9 mi.	Drives	None
W. F.-35 Male	May, 1956	Rash in axilla from frequent use of crutches	19 days	15 min., 20 mi.	Drives	None
J. D.-44 Male	Feb., 1954	None	15 days	35 min., 15 mi.	Car pool	None
C. A.-28 Male	Oct., 1953	None	10 days	25 min., 15 mi.	Drives	None

prosthesis. Only three employees had formal training and two of these were in the bilateral amputee group. The rest were self-taught.

Class 2 and 3 have been summarized in Table III. Of these amputees, only two are wheel chair bound while the rest use prostheses with and without canes. There was a total of 36 years employment for the entire group. Age of onset was 30.6 years and there was no formal rehabilitation for any employee. Traveling to and from work as a driver or rider averaged 32 miles per employee, and took an average of one hour and five minutes.

One amputee, as a result of tuberculous infection, employed for two years and working at a fast-moving machine, moderate walking activity, had no complications, no accidents, and only five days absenteeism.

Three male amputees, as a result of Burghers Disease, two of which were bilateral and one unilateral, had a total of six and one-half months absenteeism because one employee, E. M., refused to stop smoking and developed a right hemiplegia which took five and one-half months to clear.

For the three neoplastic amputees, there was a maximum of only eight days absenteeism for an individual. The congenital employee, born without arms or legs, had only eight and one-half days absenteeism, and although a sarcoma of the right stump developed three years ago, there has been no spreading or incapacity.

In the entire group, the accident rate has been zero. Complications since employment were minimal except for the right hemiplegia mentioned above in E. M., and the sarcoma in A. A. The small decubitus of left ischial tuberosity in F. F., as a result of pressure from her prosthesis, cleared after several days with readjustment of the prosthesis. B. B. required shortening of his stumps and this resulted in only a 12 day absence.

The following case report was chosen from the congenital group because he represents not only a deficiency of both legs up to midthigh, but also a deficiency of both arms up to midarm.

Case History: A. A.

Born with congenital absence of both forearms, elbows, hands, both legs, and feet, but with a right knee joint and immature toes. There was complete absence of knee joint on the left. This man is perfectly normal in every other respect. Walks on stumps enclosed in leather casings and is able to perform all activities of daily living. Attended primary and high school in the

CLASS 2 AND 3 — TABLE III.

Employee Age-Sex Marital Status	Unilateral or Bilateral	Length of Stump from Ant. Superior Iliac Spine	Type of Work	Ambulant or Wheelchair	Etiology Age at Onset	Amt. of Rehab. & Date Employ.	Complications Since Employed	Mode of Travel Time-Distance	Compensable Acc. & Absences
A) INFECTIOUS									
J. P.-53-M Married	Unilateral	Left — 2 in.	Machine Oper.	Ambulant, Crutches, no limb	Tuberculosis 27 yrs.	None 10/56	None	Drives 20 mi., 45 min.	None 5 da.
B) VASCULAR									
B. B.-47-M Married	Bilateral	A/K-Rt. 9 in. B/K-left 8 in.	Harness Assemb.	Wheel chair	Burghers Disease 39 yrs.	None 6/56	Stumps Shortened	Drives 25 mi., 50 min.	None 12 da.
W. B.-52-M Married	Unilateral	Left — 8 in.	Packaging	Ambulant with artificial limb	Burghers Disease 50 yrs.	None 1955	None	Drives 18 mi., 15 min.	None 17 da.
E. M.-56-M Married	Bilateral	A/K-Rt.-11 in. A/K-left-11 in.	Wire Prep	Wheel chair	Burghers Disease 43 yrs.	None 1953	Right hemiplegia 10/58	Carpool 20 mi., 40 min.	None 5½ mo. (L.O.A.)
C) NEOPLASTIC									
J. R.-63-M Married	Unilateral	Left — 10 in.	Harness Assem.	Ambulant-with limb and cane	Tumor 47 yrs.	None 5/29/56	None	Carpool 12 mi., 30 min.	None 5 da.
F. F.-42-F Single	Unilateral	Left — 7 in.	Secretary	Ambulant with prosthesis	Sarcoma 20 yrs.	None 9/52	Small decubitus of left ischial-tuberosity	Drives 15 mi., 30 min.	None 3 da.
S. P.-29-F Single	Unilateral	Left — 2 in.	Coil winding	Ambulant with prosthesis & crutch	Osteogenic-Sarcoma 12 yrs.	None 2/56	None	Drives 6 mi., 15 min.	None 8 da.
CONGENITAL									
A. A.-40-M Married	Bilateral Upper & lower	18 in. left and right	Foreman Packaging	Ambulant on stumps	Congenital	None 12/52	Sarcoma of rt. stump, 3 yrs. ago no spreading	Drives 20 mi., 40 min.	None 8½ da.

usual manner. The arm stumps are tapered so that the man can grasp objects in both stumps with great facility. Although this employee had several minor jobs, i.e., selling papers, this is his first real job. In 1953, surgical amputation of the toe vestiges was accomplished and an attempt was made to fit him with artificial legs. After much training, it was found that the prosthesis caused too much irritation of the stumps and in 1954, he developed a sarcomatous wart on the left stump. This was removed and he was told to use his leather boots only. He has become very proficient in the packaging department and now is foreman of the section. His general health is excellent and there has been no absenteeism due to illness except during the time of the surgical restorative attempt. He has never had any compensable accidents since employed at Abilities.

Although born a quadrilateral amputee, this person has managed to make a very superior adjustment to life. He went through grammar school and high school and even took several college courses. He is completely self-sufficient, able to dress, feed himself, etc. At present he drives his own car to and from work, after having made adaptations in the car so that it could be operated by a quadrilateral amputee. After high school, he sold newspapers at a newsstand for 16 years, and then was unemployed for one and one-half years. At present, he is very successfully performing the job of supervisor. Psychological test scores indicate that the subject shows average adjustment in his attitude toward work and his attitude toward disabled persons. He scored very low on the test for anxiety, indicating self-acceptance and lack of worry either about his physical condition or his psychological status. The adequacy of his adjustment is attested by the fact that he married several years after coming to Abilities and now has a three year old daughter and infant son.

Comment

Fatigue studies, based on actual productive performance and general health which should be reflected in the absenteeism, compensable accident rate and development of complications, were evaluated at Abilities Inc., of Long Island, a firm engaged in the manufacture of electronic equipment, both light and heavy. Although many energy expenditure studies have been published purporting to show the enormous increase in energy expenditure of the above-knee amputee, in no instance had actual fatigue studies been done under normal competitive working conditions and of amputees with a normal active social life.

It has been stated that during level walking, the energy expenditure is a linear function of the square of the speed and that a given subject adopts a "natural speed of walking" that corresponds to a minimal value of the energy expenditure expressed as cal/meter/kg.[5]

This also pertains to the above-knee amputee who learns and practices a natural walking speed so that his energy expenditure approximates but does not quite equal that of the nonamputee. In spite of this, the A-K amputee, working a full week regularly over a period of time and subjected to the same social and travel pressures as his nonamputee colleague, has a comparable work record as revealed in our tables, and has not shown any clinical manifestations of fatigue.

Conclusion

The above-knee amputee can perform industrially equally as well as the nonamputee. His work performance depends upon his ability and motivation and not upon his specific amputation.

References

1. RUSK, HOWARD A.: *Rehabilitation Medicine.*
2. RUSK, HOWARD A.: *Rehabilitation Medicine.*
3. PASSMORE, R., and DURNIM, J. V. S. A.: Human Energy Expenditure. *Physiological Review*, 35:801, Oct., 1955.
4a. MULLER, E. A. and HETTINGER, T.: Arbeitsphysiologische Untersuchungen Verschiedener Oberschenkel-Kunstbeine. *Aztschr. f. Orthop.*, 81:525, 1952.
4b. HETTINGER, T.: Der Energiemmsatz des oberschenkel-Kunstbeintragers beim Gehen auf der Treppe im Vergleich zun Normal beinigen. *Ztschr. f. Orthop.* 86:274, 1955.
5. RALSTON, H. J.: Energy-Speed Relation and Optimal Speed during Level Walking. *Int. Z. Angew. Physiol. einschl. Arbeitsphysiol. Bd.* 17, S 277, 1958.

EMPLOYMENT of the Physically Handicapped

A Survey of Industrial Plants in Atlanta, Georgia

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Human disability is a national problem of substantial proportions and many dimensions resulting in high social and economic loss in every community. The financial burden is appalling because if certain people cannot produce, others must produce for them and their dependents. How many physically handicapped citizens do we have? Estimates run as high as 28,000,000 and include all degrees of disability and all age groups. There are, however, approximately 7,000,000 of this group who would be classified as being seriously handicapped; that is, their handicap is such that difficulty would be encountered in attempts to find gainful employment.*

Since ancient times, the physically handicapped person has suffered from society's attitude as well as from his physical impairment. It has been difficult for him to assume a normal role in the social structure, and he has frequently suffered from ostracism or has been the recipient of grudging charity. This aversion to the handicapped person persists. However, the most difficult problem of the physically impaired person is most likely to be presented when he begins to seek employment; nowhere has he been at a greater disadvantage than in this connection. American employment managers continue to resist hiring the handicapped because of assumptions that they are less efficient, difficult to train, more accident prone, and for various other reasons most of which appear to represent subjective, rather than objective, thinking.

A major purpose of the study reported in this article was to uncover specific objections which managers of American industrial firms have to hiring the physically impaired. Of course, some industries and many individual firms have long had an open-minded attitude toward such a practice; however, many other industries are still quite restrictive in this respect. Heavy manufacturing, chemical, food processing — these are some of the types of industries which so often object to employing the physically handicapped. This study sought information leading to at least a partial answer to the question, "Why is the handicapped job applicant refused employment?"

A second objective of the study was to attempt to determine what types of physically handicapped job applicants will be accepted and what types are rejected among the various industries represented in the survey. Finally, company policies and attitudes of managers, supervisors, organized labor, and rank-and-file workers were investigated because of the effect of their attitudes on the entire question.

Identification of the Physically Handicapped

For the purpose of this study a physically handicapped person is defined in accordance with the definition provided by the Vocational Rehabilitation Act of 1954. This concept refers to an individual with a physical disability severe enough to constitute a serious problem in securing employment; it must be somewhat of a static nature and be such that it would be reasonably expected that vocational rehabilitation would render the person fit for remunerative employment.

Nine specific types of physical impairment were covered in the survey. Definitions for these handicaps were drawn in such a way as to exclude doubtful, minor, or borderline cases. The nine impairment types are these: cardiac, diabetic, epileptic, extuberculous, hearing, hernia, orthopedic, gastric ulcer, and vision. A tenth

Cooperation . . . the Key to Jobs for the Handicapped (Washington: AFL-CIO, Pub. No. 42, 1957), p. 10.

TABLE I.
COMPANIES INCLUDED IN THE SURVEY INDICATING MAIN PRODUCTS MANUFACTURED AND NUMBER OF EMPLOYEES

Company	Main Type of Products	Number of Employees
A Bakery	Bakery products	1,000
B Clothing	Apparel	1,540
C Automobile	Automobiles	4,760
D Steel	Steel products	1,634
E Shoe	Men's women's and children's shoes	218
F Meat Packing	Meat and meat products	710
G Publishers	Publications	1,500
H Foods	Food products	650
I Containers	Containers	1,490
J Textiles	Bags and other textile products	1,700
K Metals	Fabricated metal products	375
L Wood products	Ties, and other wood products	170
M Machinery	Electrical equipment	494
N Fertilizer	Commercial fertilizers	125
O Furniture	Bedding and other furniture	782
	Total	17,148

category represents a combination of any two or more of these nine types of disability, each in itself severe enough to fall within the definitions. Thus, as defined, each handicap requires special consideration in the job placement process.

The Company Case Studies

This study was made in metropolitan Atlanta which consisted of four counties with a total nonagricultural employment figure of 347,275 when the survey was conducted. There were 86,200 employed in manufacturing. Chosen for the study was one large firm in terms of employment, in each category of manufacturing enterprises as classified by the State Department of Labor. The companies investigated, the main types of products manufactured, and the number of employees are shown in Table I.

The total number of workers employed by these companies during the survey period represent about 20% of the average total workers employed in manufacturing in the survey area.

One point worth considering is that 12 of the 15 organizations in the survey are merely parts of multi-installation companies. That is, there are other industrial plants or warehouses, or both, belonging to the same companies and located outside the survey area. Thus, it may be assumed that other installations of the companies may have policies and practices comparable to those found in the concerns investigated. Such an assumption, however, is unsubstantiated in this study.

At the top of this list is the largest company with 4,760 employees, 841 of whom are handicapped; at the bottom of the list is the smallest company with 125 employees, only one of whom is physically impaired. Thus, each company may be looked upon as a separate case study.

Physically Handicapped Employees on Company Pay Rolls

Most of the spokesmen for the 15 industrial firms investigated appeared to feel that it is the responsibility of the company to care for its regular employees who become physically impaired, even though this may mean putting the handicapped worker in a less exacting or less desirable position. Eight of the companies maintain that all employees who become physically handicapped are retained on the pay rolls except in cases of blindness or other impairment which is considered to be of a total disability nature. In such instances the employees are retired with a pension. Three of these eight firms also stated that employees with hernia must have their condition repaired or face dismissal.

Of the seven remaining companies, one retains all employees who become handicapped except the epileptics; another company will keep its employees except those who are epileptics, totally blind, or hernia cases. The shoe manufacturing company in the survey group will not retain employees who are cardiacs, hernia cases, or vision cases unless in the latter instance the employees undergo a rehabilitation process. A paper manufacturing concern explained that it could not keep extubercular employees because of danger from the paper dust, nor will it retain epileptics on its pay roll.

The epileptic is also refused the opportunity to remain in the employment of the other three companies. Two of these concerns will not keep active hernia cases, and one will not maintain cardiacs on the pay roll. All companies that placed a restriction on employees with active hernia said that such employees would be retained if the hernias were repaired.

Attention is invited to Table II which indicates the number of physically handicapped employees on the pay rolls among the industrial firms classified by companies, types of handicaps involved, and whether the handicaps occurred before or after employment. There were 1,287 handicapped people working for the surveyed firms at the time of investigation. This figure represents about 7.5% of the total number of employees in the survey group. Table III shows that 299 or about 23.2% of the physically handicapped workers were handicapped before being hired by the organizations. Thus, it appears that the companies in the survey group are more inclined to retain regular employees who become physically handicapped than they are to hire handicapped job applicants. A little over three-fourths of the physically impaired workers became handicapped after being employed by the investigated firms.

TABLE II.
HANDICAPPED EMPLOYEES ON PAY ROLLS OF COMPANIES INVESTIGATED CLASSIFIED BY COMPANIES, TYPES OF HANDICAPS, AND WHEN HANDICAPS OCCURRED

Company and when Handicaps Occurred	Type of Handicap: Cardiac	Diabetic	Epileptic	Ex-Tuberculous	Gastric Ulcer	Hearing	Hernia	Multiple	Orthopedic	Vision	Total
A Bakery											
Before Employed:	2	3		1		1			2	2	11
After Employed:	6	2		8	15	2	2		18	8	61
B Clothing											
Before Employed:			1						1	2	4
After Employed:	3	1		1	1	8	1	1	5		21
C Automobile											
Before Employed:	58	20		9	45	36	2	5	17	23	215
After Employed:	180	30		11	180	54	10	91	22	48	626
D Steel											
Before Employed:									5		5
After Employed:	9	3		1	10				7	5	35
E Shoe											
Before Employed:			3			5			1		9
After Employed:											
F Meat Packing											
Before Employed:										1	1
After Employed:	5	4	1	6	12		1	1	1	2	33
G Publishers											
Before Employed:						10			2		12
After Employed:	8			5	10				4	1	28
H Foods											
Before Employed:						1	1				2
After Employed:	2	2			5	2	3		1	1	16
I Containers											
Before Employed:										1	1
After Employed:	12		1		50	4			6		73
J Textile											
Before Employed:											
After Employed:	3	1				1			1	4	10
K Metals											
Before Employed:			1			2			2		5
After Employed:					4						4
L Wood Products											
Before Employed:						2			3		5
After Employed:	3	1					3		1	7	15
M Machinery											
Before Employed:				2	2	3	4		15	2	28
After Employed:	10	4			5		14		6	1	40
N Fertilizer											
Before Employed:									1		1
After Employed:											
O Furniture											
Before Employed:									1		1
After Employed:	11	3	1	2	1	4			3		25
Total	312	74	8	46	340	135	41	98	125	108	1,287

Company Employment Policies

Of the 15 companies, only one had a written policy covering the employment of physically handicapped people. That company had a written policy which forbade the hiring of anyone who is blind or blind in one eye, the only type of handicap mentioned in the policy. The parent organization of the automobile plant had a written policy pertaining to this matter, but the division investigated in this study did not follow it. Only one company appeared to have a definitely established unwritten policy about hiring the physically impaired. This policy, formulated by members of top management recently, was of a very general nature and did not mention types of handicaps or jobs for which the handicapped applicant could be hired.

In four companies, executives expressed what they believed to be fairly definite policies which their organizations attempted to follow. Policies in three of these concerns favor hiring the physically handicapped when it is feasible. The personnel manager at one of the larger companies made the following comment: "If, in the opinion of the interviewer, a job applicant is suitable and able to do the job, he is considered suitable for employment in spite of his handicap. Personal characteristics are more important than physical attributes."

However, the plant manager at the meat packing company expressed a negative approach in this respect. His comment was, "We don't hire them."

Members of management in the remaining nine investigated companies either stated that they had no definite written or unwritten policies covering the practice of hiring the physically disabled, or they expressed, sometimes in a rather vague manner, what they believed to be the usual company practice. Most of them advised that their practice of hiring the handicapped was based on economic considerations. To illustrate, the plant manager at the bakery products company observed, "Physi-

TABLE III.
HANDICAPPED PERSONS EMPLOYED BY COMPANIES IN SURVEY GROUP CLASSIFIED BY TYPE OF HANDICAP AND WHETHER HANDICAPPED BEFORE OR AFTER BEING HIRED

Type of Handicap	Number Handicapped Before Employed	Number Handicapped After Employed	Total
Cardiac	60	252	312
Diabetic	23	51	74
Epileptic	5	3	8
Ex-Tubercular	12	34	46
Gastric Ulcer	47	293	340
Hearing	60	75	135
Hernia	7	34	41
Multiple	5	93	98
Orthopedic	49	76	125
Vision	31	77	108
Total	299	988	1,287

cally handicapped applicants are evaluated on an individual basis, and they are placed whenever work is available . . . ." The governing factors are the nature of the handicap and the nature of available jobs. It should be pointed out that most of the employment managers appeared to have a rather subjective approach toward the analyses of the nature of handicaps and the nature of jobs. That is, their opinions as to what types of handicapped persons could perform certain types of jobs did not appear to have been arrived at in a very objective manner.

Two of this group of companies without any definite policy usually will not hire physically impaired job applicants. This approach was illustrated by an official of the steel company who stated, "In general, we don't make a practice of hiring the physically handicapped." And only one company makes any distinction in hiring handicapped war veterans and nonveterans. In this instance, the personnel director pointed out that the company was more lenient in hiring its former employees who had become handicapped veterans than it was in situations concerning handicapped nonveterans.

Attitudes and Morale Aspects

The right attitude on the part of company management is highly essential to the successful employment of handicapped people; however, it is even more essential that such attitudes be accepted by immediate supervisors and able-bodied operative employees.

Although high-ranking managers in most of the surveyed companies expressed favorable attitudes toward the employment of people with physical limitations, it was frequently apparent that such attitudes had not trickled down into actual operating procedures where they could become effective. In a number of cases policies and opinions expressed among top levels of management conflicted with practices carried out on lower levels in the organizations.

Attitude of first-level supervisors: According to personnel directors and other high-ranking managers in the companies investigated, supervisors in six of the concerns do not favor having physically handicapped employees placed in their departments. The general feeling was that they would rather not have them. In two of these six companies, definite departmental work standards are set, and the assumption was that handicapped workers might interfere with meeting these standards. However, in five other companies, supervisors had shown a favorable attitude toward the practice of placing handicapped employees in their departments, or at least, they had never indicated any resentment in this connection.

Company spokesmen at the garment manufacturing company and at the fertilizer concern felt that the attitude of their supervisors was the same toward the handicapped and nonhandicapped workers, providing the handicapped workers could do the job. In the two remaining companies in the survey group the feeling was that immediate supervisors would offer considerable resistance if a very large number of physically impaired employees were placed under their jurisdiction.

Attitudes of organized labor groups: Eleven of the 15 firms were unionized. Of that group the wood products company was the only one in which members of top management felt that the attitude of the union toward the employment of physically handicapped workers was favorable. In three companies the unions appeared to have an attitude of indifference toward hiring and placing the physically impaired. This same attitude of indifference prevailed at two other firms so long as there was no interference with seniority provisions in the union contracts.

In the five remaining unionized companies, it was the feeling of high-ranking members of management that the unions in their plants did not look with favor upon the practice of hiring handicapped employees. The situation at one concern employing over 1,500 people is representative of this group. A spokesman at that company said that the union wants the employees who become disabled to be retained on the pay roll, but it was believed that the union would not go along with hiring the physically impaired to any great extent. A union representative at another company had told a company official that "Handicapped people cause trouble, and we rather not have them."

Effects on morale of able-bodied employees: Only one company in the survey group believed that the practice of hiring physically handicapped employees had an adverse effect on the morale of able-bodied employees; this belief was attributed to the fact that the union in the plant was very strong and would object to such action. Company executives at six of the organizations believed that hiring the handicapped had little or no effect on the morale of the able-bodied. However, in one instance it was thought that the employment of a large number of physically impaired workers would lower morale.

High level executives in the remaining eight companies thought that the employment of physically handicapped workers had a favorable effect on the morale of the rank-and-file employees; for example, the plant manager at the bakery products company stated that: "Hiring the handicapped gives the able-bodied workers an actual feeling that they belong to the com-

pany and helps to show that they would not be dismissed if they became handicapped. It aids their feeling of security."

Using able-bodied workers to help newly-hired handicapped employees: As part of the orientation program for new employees at two of the companies, a regular employee is assigned as a sort of sponsor to help the new worker become adjusted to his work surroundings; however, these were the only two firms in the study group which follow a regular practice of using able-bodied workers to help orient the newly-hired handicapped employees to their jobs. A third company has followed such practice on occasion, but it is not a part of the regular employee induction program.

There were no known cases of managers seeking cooperation on the part of able-bodied workers in helping to orient the handicapped among the remaining twelve companies. Most of the employees in four of these firms worked under some type of incentive pay plan, and it was the attitude of managers in these companies that it was not fair to ask the rank-and-file workers to give up their time to aid their handicapped fellow workers.

Rejection of Physically Handicapped Job Applicants

Table IV shows the types of handicapped applicants who are refused employment by the firms investigated.

All companies in the survey group stated they would not hire job applicants who were cardiacs, epileptics, or blind. Only one company would hire a hernia case, and in this instance it would be only for a few restricted jobs. Policies and practices concerning the hiring of other types of physically handicapped employees varied greatly among the companies.

Reasons why the handicapped are refused employment: Each employer in the survey was asked the question "Would your decision not to employ a physically handicapped person be based on one or more of the following reasons?" The reasons and the number of companies which checked each one are shown below:

1. Fear that workmen's compensation rates will go up if handicapped people are employed — three companies.

2. A belief that liability insurance rates would be affected — three companies.

3. Handicapped workers are not flexible enough in cases of necessary transfers — 12 companies.

4. Entry physical examinations are too high and rigid for the acceptance of handicapped employees — eight companies.

5. Hiring physically handicapped workers would conflict with collective bargaining agreements — six companies.

6. Conflict with present employee benefit plans — one company.

7. Belief that production schedules might be impaired — nine companies.

8. Belief that employee absenteeism might be increased — four companies.

9. Your first loyalty is to your own employees. Easier jobs should be reserved for your own aging or handicapped workers — eight companies.

10. Handicapped workers tend to be more accident prone than able-bodied employees — five companies.

11. There is extra cost involved in training or retraining the physically handicapped — four companies.

12. There is extra cost and difficulty in adapting machinery, workplaces, and plant layout to the needs of handicapped employees — seven companies.

13. Handicapped workers simply do not produce as well as able-bodied employees — one company.

14. Resistance by fellow employees — three companies.

15. Resistance by the public — one company.

16. Other reasons volunteered by company spokesmen:

TABLE IV.
COMPANIES REFUSING TO HIRE PHYSICALLY HANDICAPPED JOB APPLICANTS CLASSIFIED BY TYPE OF HANDICAP

Type of Handicap	Companies Refusing to Hire
Cardiac	All companies in the survey group.
Diabetic	A Bakery, C Automobile, F Meat Packing, G Publishers, H Foods, J Textiles, K Metals, M Machinery, N Fertilizer.
Epileptic	All companies in the survey group.
Ex-Tubercular	C Automobile,[1] F Meat Packing, J Textiles, K Metals, M Machinery,[1] O Furniture.
Gastric Ulcer	All companies except B Clothing, I Containers, J Textiles, and L Wood Products.[2]
Hearing	D Steel, F Meat Packing, G Publishers, H Foods, I Containers, J Textiles, L Wood Products, N Fertilizer, and O Furniture.[3]
Hernia	All companies except H Foods which may hire for a few restricted jobs.
Multiple	All companies except B Clothing, C Automobile, E Shoe, H Foods, and I Containers.[4]
Orthopedic	B Clothing, D Steel, F Meat Packing, H Foods, J Textiles, N Fertilizer, and O Furniture.[5]
Vision	All companies in the survey group.[6]

1. Except for a few restricted jobs.
2. F Meat Packing will hire for nonproduction jobs only; K Metals and M Machinery will not hire if condition is considered serious.
3. D Steel will hire for nonproduction jobs only; H Foods, I Containers, and J Textiles usually refuse to hire; L Wood Products and O Furniture refuse to hire the deaf.
4. D Furniture would hire a multiple case only if it consisted of diabetes and hard of hearing.
5. H Foods and J Textiles would hire orthopedics except those with back injuries or spinal deformities.
6. E Shoe and J Textiles would hire vision cases except those who are totally blind; C Automobile and L Wood Products would hire those except the blind or legally blind.

The personnel manager would not hire a handicapped person if he felt it would not be good for the person to work — one company.

Company employs comparatively few employees, and the opportunities of handicapped workers would be limited — one company.

Plant manager stated that his company demanded able-bodied people, and the handicapped are not able-bodied — one company.

Comment

Policies having to do with the hiring and placing of physically handicapped workers were characterized by their general vagueness in the firms surveyed. In a number of instances, however, it had been a long-standing practice to exclude certain types of physical impairment. When specific handicaps were disclosed in the course of pre-employment examinations, the job applicant was automatically rejected. Of course such exclusion is not selective in the sense that certain types of handicapped applicants are rejected only for certain kinds of jobs. That is, the exclusion is of a general nature; the individual with certain specified impairments will not be accepted for any position in the plant.

Furthermore, too much dependence can not be placed on mere statements of company policy. Company policies as expressed by high ranking members of management and practices carried out by employment managers in the surveyed companies did not coincide. If company executives wish their policies to be effective, such policies must be translated into more definite plans of action; and these plans must be made known to all concerned. Decisions concerning job applicants were usually left up to the employment manager who was free to use his own judgment in each case.

Policies and procedures concerning regular employees who suffered a handicap were more definite than in the case of handicapped job applicants. There appeared to be a sort of unconscious distinction between the person who became disabled after entering the service of the company and the handicapped person seeking employment. A sense of responsibility is an important factor here; furthermore, the regular employee has already demonstrated his value to the company. Conscious effort should also be made to secure the active and willing cooperation of supervisors and other employees in placing and utilizing handicapped workers. Adequate communications throughout the organizations appear to be an essential phase of the entire problem.

The positive attitudes of members of management toward the employment of physically handicapped people are not enough to assure those people gainful employment. Such attitudes, like company policies, must be given a realistic meaning. Most members of top management in the surveyed companies expressed a somewhat sentimental view regarding the subject of hiring the handicapped — civic duty, sense of obligation, humanitarian aspect. Such sentiments may be commendable, but competitive businesses cannot and should not employ the handicapped simply out of charity. It is to the point to note that these subjective attitudes were not always accompanied by objective analysis involving economic justification for hiring the impaired.

Union attitudes toward the employment of physically handicapped workers in the investigated companies are probably not well known by members of top management. In only one of the 11 unionized companies did management feel that the union looked with favor upon the practice of hiring such people. In the other 10 concerns, the union's attitude was thought to be indifferent or negative. This belief of members of management may or may not be correct. However, employment is a function of management; and whatever the members of management think regarding the union's attitudes may have an important bearing on hiring and placing the physically handicapped. Perhaps union contracts should contain specific provisions regarding the status of handicapped employees. Such provisions are especially important with regard to seniority rights and long-service employees who become impaired and can no longer perform jobs within their work unit.

Objections to Hiring the Handicapped

Subjective, rather than objective, reasoning was apparently applied in most instances in rejecting physically impaired job applicants. Seven of the 15 investigated companies said they may not hire handicapped workers because of extra cost and difficulty in adapting machinery, workplaces, and plant layout to the needs of such workers. However, none of these companies had ever made any plant structural changes for such a purpose, and three of them had never made any job or workplace modifications to suit handicapped workers. In one case, a personnel manager said that he would not hire a handicapped person if he felt it would not be "good for the person to work." A third example was that of a plant manager who said that his company demanded able-bodied people, and "the handicapped are not able-bodied."

However, the most important reason given for not hiring the disabled was that they are not flexible enough to transfer to other jobs within the organization. Twelve of the 15 firms cited this reason. This objection was further empha-

sized by the fact that nine companies feared that hiring the handicapped may impair production schedules. Perhaps the answer to these two objections lies partially in proper placement facilitated by a thorough system of job analysis and physical capacities analysis. Furthermore, hiring physically handicapped workers would conflict with collective bargaining agreements was given as a reason for rejecting the handicapped at six of the 11 unionized companies. This objection appeared to hinge largely around the question of the seniority rights of union members. Thus the belief that handicapped employees present problems because of lack of job transferability is further indicated. Some employers felt that it might be necessary to transfer physically impaired workers to jobs to which the able-bodied employees were entitled.

Another interesting type of objection to the employment of the handicapped had to do with accident proneness.* Even though there had not been a single second injury among the physically handicapped employees in the 15 companies during the year prior to this investigation, five companies objected to hiring such individuals because of the belief that they tend to be more accident prone than able-bodied workers.

Summary

One conclusion reached as a result of this study is that placement on the job, job transfers, training, and follow-up for physically handicapped employees do not present problems that differ too greatly from those involving the nonhandicapped. For example, members of management in four of the companies said they believed there is extra cost involved in training and retraining the handicapped; however, all companies followed the same method of training for both the handicapped and able-bodied workers.

It is not the intent of this study to pass judgment on the employment practices as they affect the physically handicapped workers in the companies investigated. At any rate, truly successful procedures in using the physically impaired are not merely techniques of interviewing, training, job studies, and the like. Such processes are simply aids, and the efficiency and compassion with which they are used are of more importance. Of what value are such procedures to the handicapped job applicant if he is automatically rejected because of his impairment?

The employment of physically handicapped individuals has long been a serious and difficult problem. Periods of labor shortages, such as the World War II period, have helped direct attention to the economic and social aspects involved and have been instrumental in encouraging research and education dealing with the subject. However, the economic problem is likely to achieve greater significance in the future. This added importance will come about because of the change in the makeup of the population. Even the conservative estimates place our population at 200 million before 1970; however, only about one-third of this growth will represent persons from ages 20 to 65 — the productive, working years. Thus, the economic benefits to be derived from remunerative employment of our physically impaired citizens are obvious. Once again, an oft-repeated statement comes to mind — it is ability, not disability, that counts. Gainful and productive employment for the physically handicapped person is an admirable goal, socially, morally, and economically.

*There is considerable additional evidence that this objection is not valid. See: Henry H. Kessler, *Rehabilitation of the Physically Handicapped* (New York: Columbia University Press, 1953), p. 21; Clark D. Bridges, *Job Placement of the Physically Handicapped* (New York: McGraw-Hill Book Company, Inc., 1946), p. 10; and George H. Moloney, in *Employer Roundtable* (Washington: President's Committee on Employment of the Physically Handicapped, 1955), p. 12.

Georgia Leads U. S.

For the third consecutive year, Georgia leads the nation in the number of disabled persons restored to jobs under the joint State-Federal Vocational Rehabilitation program.

Dr. A. P. Jarrell, State Director of Vocational Rehabilitation Services, said 5,914 handicapped men and women were prepared for and placed in employment during the fiscal year which ended June 30, an increase of 286 over the previous year's record.

In a message to Governor Ernest Vandiver, Miss Mary Switzer, of Washington, Director of the Office of Vocational Rehabilitation, said: "It gives me great pleasure to congratulate you and the people of Georgia once more this year on the outstanding performance of your State Division of Vocational Rehabilitation during the fiscal year that ended June 30, 1960. Again Georgia is at the top of the list of states in the number of disabled people rehabilitated to successful employment and satisfying life. Your state's record is 154 rehabilitations per 100,000 of population. This figure has never been attained before."

—From *Waycross* (Ga.) *Journal-Herald*, Aug. 6, 1960.

Theories of the Causes of Silicosis—part III

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Conclusion

It has been necessary to sketch the evolution of biological theories in the preceding general terms to show in what setting the primary process, which occurs at the particle-protoplasm interface, has its being. What is this interaction? Jäger (1950) has suggested that it is probably one of protein denaturation. The force field at the surface (or, as Iler suggests, at the edges and points) of quartz particles can rearrange the cytoplasmic protein molecules so radically that they cease to function as living agents, but become inert chemical substances. The change occurring in egg albumin on boiling an egg is an appropriate analogy. Any protein with which the silica particle makes contact is denatured. This calls for no change in the silica particle. The mummification of the macrophages described by Mavrogordato represents such denaturation of cytoplasmic protein.

The range of proteins which can be denatured by quartz is extensive. Thus, if quartz particles be injected intracardially, the circulating prothrombin is destroyed (Schepers and Schmidt, 1960). This effect can be prevented by interposing aluminum hydroxide or aluminum oxide molecules by adsorbing these substances onto the surface of the quartz particles. Similar protein denaturation has been demonstrated for albumin, fibrogen, globulin and gamma globulin.

Since it is a characteristic of living matter that it does not tolerate a change in its internal milieu, the presence of denatured protein may be expected to induce local reactions. Klemperer (1950, 1953) proposed the concept of the collagenoses. The diseases included under this heading all have in common local allergic tissue reactions to abnormal proteins. It occurred to Magarey and Gough (1952) that silicosis may well belong in the same category as the collagenoses or that at least some phases of silicotic fibrosis may be explained on the basis of protein hypersensitivity. Gough (1958) has shown that in coal miners laminated pulmonary nodules may be associated with rheumatoid arthritic features (Caplan, 1953). Assuming that the pulmonary lesion is the primary response in these instances, the peripheral arthral reaction may be due to the hemic transfer of denatured proteins. Kikuth and Schlipköter (1953) first showed that serum protein is adsorbed onto quartz particles. Scheel (1955) demonstrated that rabbits can be sensitized to quartz and that the particle agglomerating properties of serum from such animals may be used to evaluate the pathogenicity of varieties of silica. In view of this evidence, immune reactions certainly deserve serious consideration. Vigliani (1959) has recently proposed another variant of this autoimmunity. This theory depends strongly on the supposition that the plasma cell is dominantly involved in the

The first and second parts of this paper were published in the July and August, 1960, issues of *Industrial Medicine and Surgery*. This paper was presented at the McIntyre Research Foundation Conference on Silicosis and Other Industrial Pulmonary Diseases, January 25-27, 1960, at Toronto, Canada.

early responses to inhaled quartz particles; on the demonstration of gamma globulin in silicotic hyaline; variation in nonspecific immunity; and the appearance of antipolysaccharide antibodies in silicotic subjects. Vigliani postulates that necrobiosis of the plasma cell is a prime factor in the generation of anaphylactic reactions. While there is merit to several aspects of Vigliani's concept, his theory is too dependent on the plasma cell. Silicosis develops in experimental animals in the absence of a plasma cell reaction. Their occurrence in some cases of silicosis may, therefore, be coincidental.

In recent years a further biological concept has emerged. Several of the definitive demonstrations of enzyme derangements in the pulmonary tissues of experimental animals have come from King, *et al.* (1956). Since so much of pathology starts at the enzyme level, recognition of the potential role of enzyme destruction is a logical approach to the explanation for silicosis. Unfortunately, the extent of the involvement of the enzyme system has not yet been fully worked out. Some enzymes, e.g. succinic dehydrogenase, have received special attention since dehydrogenase activity furnishes a rather precise expression of the biological potency of pathogenic silica (Marks and Nagelschmidt, 1959). It is also becoming evident that enzyme impairment is relevant to the problem of silicosis not only as a local tissue phenomenon, but also as a systemic reaction. Thus, the serum alkaline phosphatase level of rats exposed to quartz dust is markedly depressed (Figure 29). It would be of interest to see what other systemic enzymes are similarly affected.

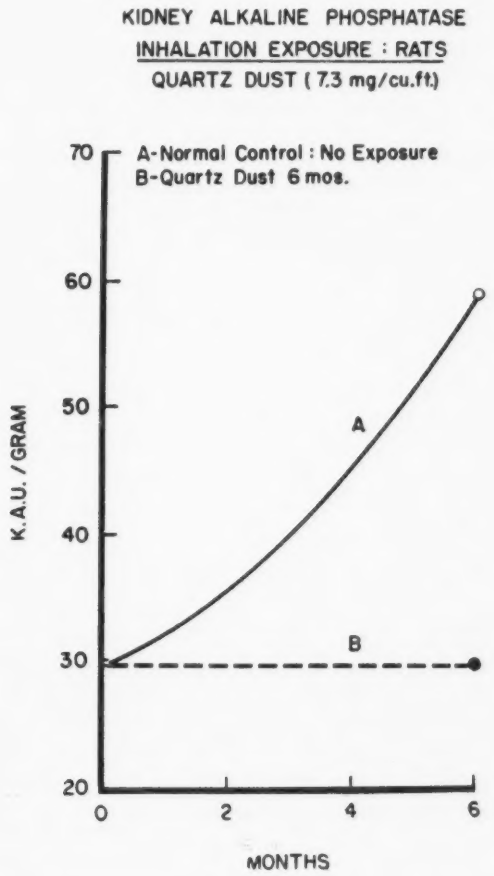


Figure 29

In recent years attention has also been focused on the significance of the mucopolysaccharide content of the lung in silicosis. This interest flowed from the demonstration of mucopolysaccharide disturbances as precursors of collagen deposition at diverse sites in various diseases. The available information has caused Holt (1957) to formulate the essential primary derangement in the lungs of subjects exposed to silica dust as a mucopolysaccharide-polysaccharase imbalance. This also is an enzyme theory, but places emphasis on the ground substance rather than on other components of the lung as the principal ingredient of the deposition of collagen. Once more, ingenious though this explanation may be, it accounts for some but not all the facets of the silicotic lesion. A more comprehensive approach is called for.

So much is already on record about silicosis that synthesis of the many isolated facts and fragmentary concepts into a simple theme seems to justify the hope that the pathogenesis of this disease may already be approximately, if not wholly, accounted for. In reviewing these facts, it seems that as yet too little attention has been given to the significance of cellular necrobiosis. From start to finish the response to silica involves the destruction of cells of various types. This fact should be clearly recognized in attempts to unify existing concepts and information.

Since the silicotic granuloma is a connective tissue reaction, no pathogenic explanation for silicosis will be satisfactory without taking cognizance of all components of this tissue, and without reference to the increased understanding of the nature and the role of these components. Contributions about this subject have come from a variety of disciplines and the relevant literature has attained formidable dimensions. In Tables VI, VII, and VIII, representative examples of discoveries which have a bearing on the pathology of silicosis have been chronologically assembled.

The prominence of the cellular components invited first attention. After their identification

TABLE VI.
PERTINENT DISCOVERIES CONCERNING FIBROGENESIS
Cellular Components

Observation	Author	Year
Fibroblast Related to Fibrogenesis	Maximow	1906
Histiocytes Phagocytose Silica	Mavrogordato	1922
Proliferation of Fibrocytes Precedes Fibrosis	Wolbach	1933
Fibroblasts Produce Collagen Fibers	Bang	1948
Procollagen Derives from Fibroblasts	Gersh	1949
Proliferation of Fibroblasts Limited by Cortisone	Castor	1950
Hyperplasia of Fibroblasts Limited by Desoxycorticosterone	Cornman	1951
Mucopolysaccharides Stored in Mast Cells	Asboe-Hansen	1951
Epifibroblastic Fibrillogenesis Demonstrated	Porter	1951
Persistence of Mobility of Koniophores Demonstrated In Vitro	Policard	1953
Scorbutic Fibroblasts Do Not Produce Fibrillary Procollagen	Robb-Smith	1954
Intrafibroblastic Fibrillogenesis Demonstrated	Jackson	1954
Silica Destroys Polymorph Leukocytes	Schepers	1955
Polysilicic Acid Found in Koniophores	Sakabe	1956
Phagocytosed Silica Particles Retained in Vacuoles	Collet	1959
Polymeric Silica Not Present in Koniophores	Wheatly	1957
Pulmonary Phagocytes Produce Collagen-like Substance	Schepers	1957
Neutrophil Leukocytes Negatively Charged	Creger	1960

by Virchow, the phagocytic action by the histiocytes and the relationship of fibroblasts to fibrillogenesis received widespread recognition. Precisely how these two types of cells function in this regard has not yet been satisfactorily clarified. Electron microscopy has shown that the silica particles lie within cytoplasmic vacuoles and that the mitrochondria are among the first structures to degenerate (Collet, *et al.*, 1959). Whether polysilicic acid forms within these vacuoles remains undecided, though evidence appears to be against this (Wheatly, 1957). Dissenting findings (Sakabe, *et al.*, 1956) may, perhaps, be explained on a technological basis. These koniophores also produce at their surface and within these vacuoles a substance which has the staining reactions for collagen (Schepers, 1957). The prolonged retention of motility of macrophages which harbor quartz particles is well demonstrated by microcinematography under phase illumination (Policard, 1959), and is the important factor in the dispersion of retained silica to lymphoid tissue and perivascular locations. The nonparticipation of lymphocytes and neutrophil leukocytes in the silicotic granuloma may be due to their high negative charge, demonstrated by Creger (1960). The destruction of eosinophilic leukocytes on contact with quartz particles (Schepers, 1955) remains unexplained. It is possible that the eosinophil normally functions defensively on behalf of tissues by bursting asunder to release its opsonins, lysozymes, or other stored contents.

TABLE VII.
PERTINENT DISCOVERIES ABOUT FIBROGENESIS
Fibrous Components

Observation	Author	Year
Connective Tissue Contains Collagen, Reticulin, Elastic Fibers	Virchow	1866
Extracellular Collagen Formation Demonstrated	Doljansky	1932
Saline Toxicity Controls Collagen Crystallization In Vitro	Nageotte	1937
Procollagen Present in Ground Substance	Orekhovich	1948
Collagen Has High Proline, Hydroxyproline, Glycine, Glutamic Acid Content	Bowes	1948
Collagen Lacks Cystine, Cysteine and Tryptophane	Stain	1949
Collagen a Giant Polypeptide Molecule Ca 150,000 A°	Pauling	1951
Polypeptide Units in Series With Salt Chains	Bear	1952
Hydroxyproline Crosslinks the Polypeptides	Gustavson	1955
Constituent Tropocollagen Units Arranged in Staggered Manner	Schmitt	1957
Proteases Control Tyrosine End Plates of Polypeptides	Hodge	1960

This is how mast cells release histamine, heparin or serotonin when challenged by toxic agents (Mota and da Silva, 1960). The precise manner in which fibroblasts participate in fibrillogenesis is undecided. Fibrils form either epicellularly (Porter, 1951) or intracellularly (Jackson, 1954). It is also likely that fibroblasts other than scorbutic cells (Robb-Smith, 1954) secrete procollagen into their surroundings (Gersh, 1949). Super-added factors not generated by the fibroblast are necessary to crystallize this procollagen as collagen. The proliferation of fibroblasts is the key to fibrogenesis (Wolbach, 1933) and this proliferation is normally held in check by

TABLE VIII.
PERTINENT DISCOVERIES ABOUT FIBROGENESIS
Ground Substance

Observation	Author	Year
Mucoid Nature of Ground Substance Recognized	Virchow	1866
Reticulin Deposition a Labile Precursor of Fibrosis	Bielchovsky	1918
Ground Substance an Integral Vital Component	Schade	1923
Fibrinoid Degeneration in Ground Substance	Gerlach	1924
Allergic Factor in Rheumatoid Fibrosis Mediated Through Ground Substance	Klinge	1933
Ground Substance Comprises: Hyaluronic Acid, Chondroitin, Chondroitin Sulfates A, B and C, Keratosulfate	Meyer	1938
Chondroitin Sulfate the Salt Link Between Collagen Polypeptides	Meyer	1938
Hyaluronidase Hydrolysis Glycoprotein	Chain	1940
In Vitro Chondroitin Sulfate and Hyaluronic Acid Crystallize Collagen	Cohen	1942
Ascorbic Acid Needed for Polymerization of Glycoprotein	Danielli	1945
Hyaluronic Acid Dominantly Involved in Collagenation	Meyer	1947
Chondroitin Sulfate as Template to Orientate Collagen Fibrils	Partridge	1948
Fibrinoid Precipitated from Ground Substance by Basic Protein	Altschuler	1949
Hyaluronidase Inhibits Collagen Formation	Mancini	1950

adrenal cortical hormones (cortisone, desoxycorticosterone). The role of mast cells has remained uncertain. It has been suggested that they manufacture histamine, heparin, serotonin and other mucopolysaccharides (Asboe-Hansen, 1951). It is not certain that these cells manufacture all or even any of these substances, though they no doubt store them.

In the development of the silicotic nodule, collagen deposition is a dominant terminal process. In some varieties of the pneumoconioses, reticulin formation predominates and in others elastic tissue accumulates. Not everything established about the formation of collagen reticulin and elastic fibers is relevant to the understanding of silicosis.

Some of the most important discoveries about this matter were made several decades ago and concern the demonstration of extracellular collagen (Doljansky, 1932, Nageotte, 1935). This lead to the identification of procollagen in the ground substance of connective tissue (Orekhovich, 1948). Chemically, the large collagen molecule (Pauling, 1951) consists of parallel polypeptide and salt chains (Bear, 1952) characterized by a high proline, hydroxyproline, glycine and glutamic acid content (Bowes, *et al.*, 1948) and absence of cystine, cysteine and tryptophane (Stain, 1949). The parallel chains are cross-linked by the hydroxyproline (Gustavson, 1953). Thus, the collagen fibril comes to be composed of staggered tropocollagen units (Schmitt, 1957), the ends of these units being kept apart by proteases functioning at the tyrosine rich end plates (Hodge, 1960). Factors which will facilitate precipitation of collagen from procollagen by the realignment of the tropocollagen units must be generated by silica to explain fibrogenesis in this condition.

The mucoid nature of connective tissue ground substance was described by Virchow (1866), but he failed to recognize the ground substance as more than a suspending medium for the cellular components. Seventy years passed before Schade (1923) defined this ground substance as an integral functional component. Its vital role was brought sharply into focus by Gerlach's (1924) demonstration of fibrinoid degeneration in protein hypersensitivity. While the participation of an allergic factor operating through the medium of the ground substance was suggested by Klinge (1933), understanding of its precise role only came with the identification of the mucopolysaccharides hyaluronic acid, chondroitin, chondroitin sulfates A B and C and keratosulfate (Meyer, 1938, 1947, 1950). Since then, it has become apparent that the ground substance is charged with additional biochemical compounds (heparin, histamine, monamines, etc.) and various enzymes (glycuronidase, hyaluronidase, monamine oxidase, etc.) and their respective inhibitors.

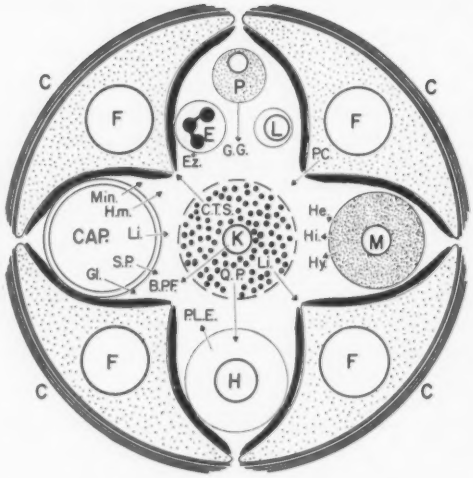
The first hint of a relationship between collagen formation and the ground substance glycoproteins came with the discovery that chondroitin sulfate furnishes the salt links between collagen molecules at the hydroxyproline sites. This linkage is apparently effected by means of hydroxyl bonds (Fraser, 1959). Permeability of the ground substance is one of its more impressive characteristics, and this permeability is controlled by the degree of hydrolysis of the mucopolysaccharides (Chain, 1940). It has been shown that in vitro chondroitin sulfate or hyaluronic acid can precipitate collagen from solutions (Cohen, 1942). Production of these glycoproteins is under hormonic influence (Ludwig, 1950). Heparin, which is present in lung tissue, can do likewise (Asadi, 1954). These discoveries lead to the suggestion that hyaluronic acid in particular may be involved in the in vivo formation of collagen (Meyer, 1947), the process being normally held in check by hyaluronidase (Mancini, 1950). Procollagen can also be precipitated by acidic shifts in pH (Meyer, 1950) or by disturbance of the hyaluronidase/chondroitin sulfate ratio (Watson, 1950). In this process the chondroitin sulfate may act as a template to orientate the collagen fibrils (Partridge, 1948).

The lack of a relationship between fibrinoid and collagen was clarified with the discovery that fibrinoid contains no proline or hydroxyproline, but is rich in the protein moieties of degraded nucleoproteins (Klemperer, 1953).

It has become apparent that the mucopolysaccharides have a negative charge with high affinity for water and cations (Dorfman, 1953) and accumulate in tissues harboring SiO_2 (Curran, 1952). Factors which control their production have received considerable attention. Among these, the properties of hyaluronidase are best known. It is significant that this enzyme can be inhibited not only by Fe^{++++}, Cu^{++}, Fe^{++} or Zn^{++} (Meyer, 1951) but also by SiO_2 (Holt, 1952). Studies should include other enzymes since it is evident that amines of glucose, mannose and galactose also participate in the stabilization of collagen (Consden, 1958, Jackson, 1954). The role of reticulin also requires closer scrutiny since Schwartz (1957) demonstrated by electron microscopy that mucopolysaccharides precipitate on the surface of reticulin fibers in the early stages of fibrogenesis. It has been suggested by Holt (1960) that the best way to view this problem would be to consider that the procollagen-collagen balance is matched by a critical polysaccharide/polysac-

charase ratio. In silicosis imbalance may result from destruction of enzyme complexes as suggested by King, *et al.* (1957).

Most of the foregoing facts find direct application in explaining the development of silicotic lesions. Several phases are, however, not accounted for. If silica acts simply by direct interference with enzymes, mucopolysaccharides, procollagen or similar biochemical tissue components, one would expect an immediate or direct reaction of the same kind as that which is characteristic of the final lesion. This is not the case. The initial response to retained SiO_2 is quite dissimilar to the end result. At first microvascular reactions, cellular invasion, and cell destruction predominate. Later the vascular response decreases, cell types change, and granulomata form. Next degeneration sets in, and finally and belatedly fibrogenesis commences. Rather clearly, the silicotic lesion evolves through complicated stages for each of which there is a beginning point and an endpoint. It is important to note that the lesion remains evanescent or reversible until necrobiosis has commenced. This suggests that a fibrogenic factor may be released from disintegrating koniophores, or that the death of the histocyte terminates the production of a homeostatic agent which normally keeps procollagen in solution. The possible interplay of these forces has been graphically summarized in Figure 30. In this diagram the stage of primary phagocytosis of the quartz particles has been passed and the koniophore is now located in an appropriate lymphatic nidus and is beginning to die and disintegrate. The koniophore is adjacent to a vascular capillary, which contributes to the environs of the koniophore: plasma fluid, mineral constituents, hormones, lipids, seroproteins and carbohydrate substances. The disintegrating koniophore releases the quartz particles which are partially protein coated and, for that reason, temporarily relatively noninjurious and readily phagocytosed by secondary histiocytes which have congregated around the primary koniophore. Lipids are also released by the koniophore and perhaps other chemotactic agents which specifically attract fibroblasts, mast cells, and perhaps other cells such as eosinophilic leukocytes, plasma cells and lymphocytes. The nuclear chromatin may unite with fibrin to form fibrinoid. Histiocytes are likely to release proteolytic enzymes and so are polymorphonuclear leukocytes. The latter are, however, decidedly rare at this stage. The mast cells may release heparin, histamin, serotonin, hyaluronidase and perhaps some gamma globulin. Plasma cells may also contribute the latter. Lymphocytes proliferate in the vicinity of such cellular reactions to



CYTOCHEMICAL REACTIONS ATTENDING THE DEATH OF THE QUARTZ-LADEN KONIOPHORE

C-COLLAGEN; E-EOSINOPHIL LEUCOCYTE; F-FIBROBLAST; H-HISTIOCYTE; K-KONIOPHORE; L-LYMPHOCYTE; M-MAST CELL; P-PLASMA CELL.
B.P.F.-BASIC PROTEIN IN FIBRINOID; C.T.S.-CHEMOTAXIS OF CELLS
Ez-ENZYMES; G.G.-GAMMA GLOBULIN; Gl.-GLUCOSE; He.-HEPARIN; Hi.-HISTAMINE; Hy.-HYALURONIC-CHONDROITIN; Hm.-HORMONES; Li.-LIPIDS; Min.-MINERALS & ELECTROLYTES P.C.-PROCOLLAGEN; P.L.E.-PROTEOLYTIC ENZYMES; Q.P.-QUARTZ PARTICLES; S.P.-SEROPROTEINS

Figure 30

quartz particles, but precisely what their contribution may be has so far eluded us. The fibroblasts secrete procollagen into the ground substance and thus furnish the material from which collagen may be precipitated in the manner already outlined.

Subsequent phases in the development of the silicotic lesions will recapitulate the foregoing, with the difference that the process now has to take place amidst the detritus of destroyed cells and partly formed collagen. The area will become ever more ischemic and this will influence the further evolution of the process through the withdrawal of oxygen, nitrogen substances and hormones, and the accumulation of lipids and minerals.

Summary

In this review, 50 of the main theories of the causation of silicotic lesions have been briefly discussed. Theories have been broadly classified as exploratory, chemical, physiological and biological. All have contributed to the understanding of the problem.

During recent years, increased knowledge of the biochemistry of connective tissue has furnished important clues to the clarification of the process of silicotic fibrosis. A synthesis of available information is attempted.

References

ALTSHULER, C. H. and ANGEVINE, D. M.: *Am. J. Path.*, 25: 1061, 1949.

ASADI, A. M., DOUGHERTY, T. E. and COCHRAN, G. W.: *Anat. Record*, 118:278, 1954.

ASBOE-HANSEN, G.: *Om Bindevaevets Mucinose Substanser*, Rosenskilde og Baggers, Kopenhaven, 1951.

BANG, F. B. and GEY, G. O.: *Proc. Soc. Exp. Biol. & Med.*, 69:86, 1948.

BEAR, R. S. *Adv. Protein Chem.* 7:69, 1952.

BIELCHOVSKY, N.: *Cowdry's Special Cytology*, 2:709, 1932.

BOWES, J. H. and KENTEN, R. H.: *Biochem. J.*, 43:358, 1948.

CAPLAN, A.: *Thorax*, 8:29, 1953.

CASTOR, W. C. and BAKER, B. L.: *Endocrinology*, 47:234, 1950.

CHAIN, E., and DUTHIE, E. S.: *Brit. J. Exp. Path.*, 21:324, 1949.

COHEN, S. S.: *J. Biol. Chem.*, 144:353, 1942.

COLLET, A., and DANISL-MOUSSARD, H.: *Arch. Inter. Pharmacodynamie*, 118:189, 1959.

COLLET, A., and DANIEL-MOUSSARD, and REV. FRANCAISY d'ETUDE: *Clin. e. Biol.* 4:710, 1959.

CONSDEN, R.: *Nature and Structure of Collagen*, Butterworth and Company, London, 1958.

CORNMAN, I.: *Science*, 113:37, 1951.

CREGER, W. P. and THOMAS, P. N.: *Nature*, 186:171, 1960.

CURRAN, R. C.: *Brit. J. Exper. Pathol.* 33:82, 1952. *J. Pathol. and Bacteriol.*, 66:271, 1953.

DANIELLI, G. F., FELL, H. B. and KODICEK, E.: *Brit. J. Exp. Path.*, 26:367, 1945.

DOLJANSKY, L., and ROULET, F.: *Virchow's Arch. Pathol. Anat.* 291:200, 1932.

DOLFMAN, A.: *Ann. of the New York Acad. Sci.*, 56:698, 1953.

FRAZER, R. D. B., and MACRAE, T. P.: *Nature*, 183,179, 1959.

GERLACH, W.: *Virchow's Arch. Path. Anat.* 247:294, 1924.

GERSH, I.: *Arch. Pathol.*, 47:99, 1949.

GERSH, I., CATCHPOLE, H. R.: *Am. J. Anat.* 85:457, 1949.

GOUGH, J.: *Proc. McIntyre Res. Fndt.*, 9:1958.

GOUGH, J., MAGARREY, F. R.: *Brit. J. Exp. Pathol.* 33:76, 1952. *Brit. J. Exp. Pathol.* 33:510, 1952.

GUSTAVSON, K. H.: *Swensk. Kem. Tidskr.*, 65:70, 1953. *Nature*, 175:70, 1955.

HODGE, A.: *Sci.*, 131:1323, 1960.

HOLT, P. F.: *Nature*, 169,306, 1952. *Pneumoconiosis*, Arnold, London, 1957.

HOLT, P. F. and WENT, C. W.: *Brit. J. Ind. Med.*, 17:25, 1960.

ILER, R. K.: *The Colloid Chemistry of Silica and Silicates*. Cornell University Press, Ithaca, New York, 1955.

JACKSON, S. F.: *Nature*, 173:950, 1954.

JAGER, R.: *Kolloid Zschr.* 119:165, 1950.

KIKUTH, W. and SCHLIPKOTER, H. W.: *Arch. Hyg.*, 137:53, 1953.

KING E,. J., ZAIDI, S. H. and NAGELSCHMIDT, G.: *Arch. Ind. Health*, 13:133, 1596.

KING, E. J., SCHMIDT, ROMAN, W. and KIND, P. R. N.: *Enzymologia*, 17:341, 1956.

KLEMPERER, P.: *Am. J. Pathol.* 26:505, 1950. *Wien. Klin. Wchnschr.*, 65:713, 1953. *Harvey Lecture*, 1953.

KLINGE, F.: *Erg. d. Allg. Path. u. Path. Anat.* 27:1, 1933.

LUDWIG, A. W. and BOAS, N. F.: *Endocrinology*, 46:291, 1950.

LUDWIG, A. W., BOAS, N. F. and SOFFER, L. F.: *Proc. Soc. Exper. Biol. and Med.*, 73:137, 1950.

MANCINI, R. E. and DE LUSTIG, E. S.: *Rev. Soc. Argent. Biol.*, 26:227, 1950.

MAKKS, J. and NAGELSCHMIDT, G.: *AMA. Archiv. Indust. Health*, 20:383, 1959.

MAVROGORDATO, A.: *Bibl. S. A. Qurt. Med. Res.*, 2:107, 1922. *Bibl. S. A. Qurt. Med. Res.*, 19:1, 1926.

MAXIMOW, A.: *Archiv. f. Mikrosk.-Anat.*, 67:680, 1906.

MEYER, K.: *Cold Spring Harbor Symposia Quant. Biol.* 6:99, 1938. *Phys. Rev.* 27:235, 1947. *Connective Tissues*, Josiah Macy, New York, 1950.

MEYER, K. and RAPPAPORT, M. M.: *J. Biol. Chem.*, 188, 485 1951.

MOTA, I. and DIAS DA SILVA, W.: *Nature*, 186:245, 1960.

NAGEOTTE, J. and GUYON, L.: *Arch. Sci. Biol., Napoli*, 41:1, 1935.

OREKHOVICH, V. N., TUSTANOVSKII, A. A., OREKHOVICH, K. D. and PLOTNIKOVA, N. E.: *Biochim. Leningr.*, 13:55, 1948.

PARTRIDGE, S. M.: *Biochem. J.* 43:387, 1948.

PAULING, L. and BRANSON, H. R.: *Proc. Nat. Acad. Sci. Wash.*, 37:205, 1951.

PAULING, L. and COREY, R. B.: *Proc. Nat. Acad. Sci. Wash.*, 37:272, 1951.

POLICARD, A. and COLLET, A.: *Rev. Hemat.*, 8:132, 1959. *Bull. de Microsc. Appl.* 9:81, 1959.

POLICARD, A., COLLET, A. and PREGERMAIN, S.: *Path. Biol.*, 7:19, 1959.

PORTER, K. R.: *Connect. Tissue*, 2:126, 1951.

ROBB-SMITH, A. H. T.: *Connect. Tissue, Munksgaard*, Copenhagen, 1954.

SAKABE, H., HASEGAWA, T. and YAMADA, K.: *Bull. Inst. Publ. Health*, 5:7, 1956.

SCHADE, H.: *Die Physikalische Chemie in der innern Medizin.*, Steinkopff, Dresden, 1923.

SCHEEL, L. D.: *AMA Archiv. Ind. Health*, 12:262, 1955.

SCHEPERS, G. W. H.: *AMA Archiv. Indust. Health*, 12:1, 1955. *AMA Archiv. Indust. Health*, 12:100, 1955. *AMA Archiv. Indust. Health*, 12:266, 1955. *Proc. Am. Ind. Hyg. Foundation*, 20:1, 1956. *AMA Archiv. Indust. Health*, 16:203, 1957. *Proc. Am. Coll. Cardiol.* 7:48, 1957.

SCHEPERS, G. W. H. and SCHMIDT, J.: *Proc. McIntyre Res. Fndt.*, 1960.

SCHMIDT, F. O.: *J. Amer. Leather Chem. Assoc.* 34:430, 1957.

SCHWARZ, W.: *Connective Tissue*, Blackwell, Oxford, 1957.

STAIN, W. H. and MOORE, S.: *J. Biol. Chem.*, 178:78, 1949.

VIGLIANI, E. C. and PERNIS, B.: *J. Occup. Med.*, 1:319, 1959.

VIRCHOW, R.: *Virchow's Arch. Path. Anat.*, 35:186, 1866.

WATSON, E. M. and PEARCE, R. H.: *Ann. N. Y. Acad. Sci.*, 52:1004, 1950.

WHEATLY, K.: *Research*, 10:76, 1957.

WOLBACH, J. B.: *Am. J. Pathol.*, 9:689, 1933.

Caffeine Tachyphylaxis

If you don't get a lift from your daily coffee break, your "timing" may be off.

What is believed to be the first experimental evidence on the effect of caffeine on the isolated cortex of the brain has been collected by two scientists at the University of Michigan Medical Center, Edward P. Domino, M.D., Associate Professor of Pharmacology, and Ajit K. Maiti, Ph.D., a postdoctoral Fellow who is investigating brain stimulants. They say the caffeine in one cup of coffee partially blocks the effects of a second cup for about three hours. Science calls it "Tachyphylaxis."

Caffeine, the researchers found, is a tricky drug. While it stimulates you, it also gives you temporary immunization against further stimulation. The average cup of American coffee contains 100 mg of caffeine. It is quick-acting. In about 20 minutes you get peak stimulation for the amount of coffee drunk. You continue at this level for two and one-half hours, then the effect quickly ends. Curiously, an additional dose taken during the two and one-half hour span will not raise the level of stimulation as much as the first dose. For example, if you have breakfast coffee at 7 a.m., you will get little "lift" from a coffee break until after 10 a.m.

There are large individual variations in this tippling timetable and the findings do not attempt to measure other values one might get from a coffee break. The researchers are concerned with neuro- and psychopharmacology, not social habits.

Science Miniature

Some Neuropathologic Aspects of Boxing

KARL T. NEUBUEGER, M.D.

Brain damage associated with professional boxing has received ever increasing interest in recent years. An editorial in this journal published in 1951 called boxing "the nation's most dangerous trade."[1] Death may occur after boxing matches due to gross brain injury, or neurologic disturbances may arise in immediate connection with head traumas ("traumatic encephalopathy of boxers," Grahmann and Ule[2]).

Symptomatology and pathology of these lesions are comparatively well known, and will not be considered here. What we are interested in is the so-called "dementia pugilistica" (a more suitable name than "punchdrunkenness") of professional boxers. This is a chronic progressive dementia, sometimes with extrapyramidal symptoms, which develops in boxers after a free interval of several years' duration. The symptomatology has been well described by both neurologists and laymen, and has been dealt with in a recent leading article in *The Lancet*.[3] The author of this article discusses all the cerebral hazards of boxing and refers to "the characteristic history of repeated battering, at first with no after-effects, but later with progressive blunting of everything that matters most in the human mind, and the final mental wreck." Critchley[4] has studied a great number of such cases clinically. Pathological studies of the brain in this condition have been very few in number. In response to the leader in *The Lancet*, Daniel and Strich[5] have pointed out the desirability of continued research in this field.

We[6] had the opportunity to examine two pertinent cases, after related observations had been published and thoroughly discussed by Brandenburg and Hallervorden,[7] and Grahmann and Ule.[2] Our first case was a man of 46, who had boxed between the ages of 14 and 36, and had had 130 professional fights; he was knocked out 30 times. During the last years, he complained of headaches, blackout spells and tremor, and was unable to work consistently. He held odd jobs, such as night clerk in skid-row hotels. A brain biopsy showed a slight numerical reduction of neurons in the lower layers of the frontal cortex and a striking diffuse proliferation of large astrocytes. The second patient died of pulmonary fibrosis and right heart failure at the age of 53. He had been a boxer between the ages of 18 and 24, and was well known as a middleweight in the 1930's. Newspaper clippings of that time give accounts of his staying power, i.e., his ability to win or finish a fight after having been knocked down. He quit the profession because of a temporarily paralyzed left side and went into business with some success. While in his forties, he gradually became forgetful, confused, irritable and moody; he had an ataxic gait and became progressively demented. His brain was atrophic, especially in the frontal lobes; this was more pronounced on the right side. Microscopically the atrophy was even more severe and widespread than had been anticipated on gross examination. It resembled to some degree Pick's disease, a "presenile" brain condition leading to mental deterioration.

The histologic findings in the cases published by other authors[7,2] were essentially similar to Alzheimer's disease, another form of presenile mental deterioration. All observations were compatible with early involution of the brain, and were explained by the authors to be due to premature aging of the cerebral colloids. But what causes this untimely senescence? It was the conviction of the other writers, as well as of ourselves, that thixotrophy played a part; this is a disturbance of the gel-sol equilibrium, caused by shaking, stirring, ultrasound or other mechanical factors. Concussion produces a change in the colloid medium of the cerebral tissue (Hallervorden[8]). Boxers are subject to repeated concussions that, although often subliminal, may be assumed to incur sequelae. Electroencephalographic abnormalities were repeatedly demonstrated (Pampus and Grote[9]). A permanently altered state in the cerebral colloids, with inability to revert to normal equilibrium, may eventually result. This process leads to early aging of the brain. Circulatory disturbances incident to concussion may also play a role.

Should we, then, favor abolition of professional boxing? This is a question of philosophy and, of course, of business interests. Leaving aside the latter, of which we don't pretend to understand anything, we feel that the responsible parties should realize that professional boxing is a potentially very dangerous endeavor. They may justly counter that the same is true of bull fighting, mountaineering, skiing, etc., and that nobody would seriously think of abolishing these activities. It may be mentioned here that Queen Victoria wanted to abolish mountaineering by law, after the famous disaster on the Matterhorn in 1865 (Learoyd[10]). All sports have their hazards that must be reckoned with and kept to a minimum. We would not take issue with the Honorary Medical Officers of the British Amateur Boxing Association, who consider medically supervised amateur boxing "a useful, healthy, and worthwhile sport."[11] Several other letters

to *The Lancet* express similar opinions; some writers, however, explicitly state that professional boxing is a different matter. The hazards here are infinitely larger. Consequently, we think that promoters should be put under strict obligation to inform their prospective candidates of the inherent dangers, emphasizing the fact that delayed mental deterioration may occur in an as yet unknown, but certainly significant, percentage of professional boxers. We do not assume that professional boxing rules could be changed to such a degree that serious head injury would be avoided. There is no other sport with so much repeated light to severe damage to the head. Many professional boxers can take much damage without becoming disabled eventually; it is well known that there are variations in the reaction to head trauma in different individuals. Nevertheless, we are convinced that boxing fans, promoters, referees, and advertisers would be shocked if they would check on the mental condition of some of their pugilists 15 or 20 years after the termination of their boxing careers.

References

1. Editorial: The Nation's Most Dangerous Trade—Professional Boxing. *Indus. Med. & Surg.* 20:571-572, 1951.
2. GRAHMANN, H., and ULE, G.: Beitrag zur Kenntnis der Chronischen Cerebralen Krankheitsbilder bei Boxern (Dementia Pugilistica und Traumatische Boxer-Encephalopathie). *Psychiatria* 134:261-283, 1957.
3. Editorial: Boxing. *Lancet* 1:1185-1186, 1959.
4. CRITCHLEY, M.: Medical Aspects of Boxing, Particularly from a Neurological Standpoint. *Brit. M. J.* 1:357-362, 1957.
5. DANIEL, P., and STRICH, S.: Letter to the Editor. *Lancet* 1:1281, 1959.
6. NEUBUERGER, K., SINTON, D., and DENST, J.: Cerebral Atrophy Associated with Boxing. *A.M.A. Arch. of Neur. & Psych.*, 81:403-408, 1959.
7. BRANDENBURG, W., and HALLERVORDEN, J.: Dementia Pugilistica mit Anatomischem Befund. *Arch. Path. Anat.* 325: 680-709, 1954.
8. HALLERVORDEN, J.: Hirnerschütterung und Thixotropie. *Zentralbl. Neurochir.* 6:37-42, 1941.
9. PAMPUS, F., and GROTE, W.: Elektrencephalographische und Klinische Befunde bei Boxern und ihre Bedeutung für die Pathophysiologie der Traumatischen Hirnschädigung. *Arch. Psychiat.* 194:152-178, 1956.
10. LEAROYD, C. G.: Letter to the Editor. *Lancet* 1:1253, 1959.
11. BLONSTEIN, J. L., *et al.* Letter to the Editor. *Lancet* 1: 1280-1281, 1959.

Books

Survey of Employers' Practices and Policies in the Hiring of Physically Impaired Workers

Federation Employment and Guidance Service. Pp. 133. New York, 1959.

The goal of this study was a survey of the practices and policies of New York City firms with respect to the hiring of disabled workers. Under what circumstances are the disabled hired and under what circumstances are they rejected? Are employers more willing to hire some types of disabled persons and less willing to hire others?

There is a large number of impaired persons in the United States who are only partially disabled in that they are quite capable of maintaining jobs in private industry, if properly placed. It is this group with which the survey was concerned. Without remunerative employment, such persons must be supported by means of public welfare or private care. With employment, however, they may continue their roles as productive citizens, and contribute to the general health of the nation.

This elaborate study led to many succinct conclusions. Out of 34 recorded ones a few are introduced to indicate the flavor of this outstanding study of attitudes and practices as to the employment of the handicapped:

"Most of the respondents, at some time in the past, had employees with cardiac or orthopedic conditions. About half stated that they had employees with epilepsy; very few had workers with cerebral palsy or serious visual problems. There was little variation on this point among the seven industries."

"Among the firms with 500 or more employees, 37% of the personnel officers stated that their firms had knowingly hired disabled applicants during the year preceding the survey; 63% replied that none had been knowingly hired. Among firms with 200 to 499 employees, 22% replied that disabled had been knowingly hired; 78% replied that no disabled had been hired during the preceding year."

"The pattern of replies for each industry clearly indicates that orthopedics are the least unacceptable of the five types of disabilities included in this survey. This group is closely followed by cardiacs. The remaining three types of disabilities are clearly much more unacceptable."

"Pre-employment physical examinations are required from the majority of applicants for nonsupervisory positions in almost all of the largest firms (500 employees or more). The only exceptions are in the apparel industry where the larger number of firms do not require such examinations; and printing and publishing, where only about half of the firms have this requirement."

"Pre-employment physical examinations are used for reasons other than screening out persons with impairments. They are used also for selective placement and for supervision of medical care."

"Less than one personnel officer in ten gives workmen's compensation costs as a factor that influenced him against the hiring of the impaired."

"Four respondents in ten believe there are advantages to a firm in hiring the impaired. One, who saw no advantage, thought the firm had an 'obligation to hire them.'"

"One-third of the total respondents believe that impaired employees are 'better' workers.

"Half of the respondents expressed the belief that the disabled are more conscientious; half felt they could not generalize. However, only one-fifth of the respondents indicated that their hiring practices might have been influenced by the belief that the disabled tend to be more conscientious.

"Over one-third of the respondents believe that the disabled were less likely to abuse sick leave; over half said they could not generalize. Not more than one-tenth, however, indicated that their hiring practices were favorably influenced by this factor."

"Six respondents in ten believe that the impaired are less likely to quit; one-third could not generalize. Only one-seventh, however, were favorably influenced by this factor."

Health Physics Instrumentation

Volume 1 of Division V., Health Physics of the International Series of Monographs on Nuclear Energy, by John S. Handloser, $6.50, Pp. 182, illustrated. Pergamon Press, New York, 1959.

There are few books that attempt to cover the diverse instruments and methods which a health physicist is called upon to use in his efforts to evaluate and control radiation exposure. This book is a welcome addition for anyone engaged in the practice or the teaching of this tricky subject. The author is a man with extensive practical experience and his book contains a wealth of information that is available, if at all, only in widely scattered reports and journal articles.

At the same time, and reluctantly, it must be said that the book is a disappointment. There are many indications that it was written, edited and printed in haste. But in this day of multi-authored books one should be charitable of the efforts of a man who undertakes to write a book singlehanded.

In exercising such charity one can forgive the omission or cursory treatment of topics like solid state detectors, the variation of instrument sensitivity with radiation energy, the applications of gamma ray spectrometers and disaster monitors, even though he knows that the author's knowledge of these subjects is extensive. It is difficult, however, to be charitable about some of the incorrect or misleading statements that have been allowed to slip in.

The sentence at the bottom of page 7 that implies that the spread of energies from a beta source arises solely from self absorption within the source; the statement in the last paragraph on page 12 that the roentgen involves the absorption of "about 98 ergs" per gram of tissue, overlooking the fact that this energy absorption may range from over 400 ergs per gram to less than 50 ergs per gram, depending on the type of tissue and the quantum energy of the radiation; and the statement in the paragraph at the top of page 23 that "there is no simple theory to relate the change collected and the radiation dose," ignoring the exquisite experimental and theoretical aspects of the Bragg-Gray principle, are difficult to forgive.

The publisher must accept his share of criticism. Many of the range-energy curves are extremely difficult to read, if that was indeed the intent. The references to Figures 1-6 and 1-7 in the text at the bottom of page 10 are reversed. The letter "M" in the second equation on page 10 should be part of the exponent. Fig. 2-1 on page 19 pertains to heavy, positively charged particles, but certainly not to electrons, as might be inferred from the caption. Nowhere is there a key to explain the many numbered parts in Fig. 4-6 on page 69.

Those who know and admire the author of this book will commend him for what he has done but regret that he was not allowed the time, or did not insist on being allowed the time to prepare a book that would share with others his thorough and critical grasp of the subject.

—G. HOYT WHIPPLE

1960 Study of Industrial Retirement Plans

Bankers Trust Company. New York, 1960.

As indicated by the title, this paper bound book explores the provisions of over 425 leading commercial and industrial organizations that cover approximately 6,000,000 employees. Whether retirement plans in any industrial organization are delegated to the insurance division, the personnel department or to the medical department, the contents of this book provide much that is provocative.

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VOLUME XXIX

NUMBER 9

The First 1,000 Manuscripts

By the time the printer's ink for this item is dry, more than 1,000 major scientific manuscripts on occupational health will have been processed under the current and nine years of editorship of this journal. This lot, submitted to a single periodical, approximates five times the total output for the entire United States during the full century that ended in the year 1900.

Some of these manuscripts have been a credit to the medical specialty that produced them, and a credit to the journal that published them. A few superb contributions deserve republication as mileposts in the history of occupational health. The majority of these 1,000 manuscripts have proved to be "publishable" and have been published, but without editorial ecstasy. Some 300 of these 1,000 manuscripts have been rejected.

The days of an editor are uneasy days. Patiently the arrival of the perfect manuscript is awaited but it never comes. More likely there will arrive the troublesome manuscript, the one of uncertain merit, the one filled with exaggerative claims, the one serving only a selfish cause. Earth holds few furies equal to that of some authors reading a rejection slip. Not always is it expedient to reveal to an author the exact reason for the rejection of his offering. Humane considerations do and should curb the rejecting pen. The commonest cause of manuscipt rejection is utter lack of pertinency to occupational health. Few readers of this journal would be attracted by such a title as "Spleen Enlargement in Children in Quintana Roo." One function of the uneasy editor is to protect readers against the extraneous.

Every author believes that his opus is without flaw or blemish and of merit that will alter the course of all medicine. Rarely the letter that may accompany a manuscript arrogantly will demand that the manuscript be altered by not so much as a jot or tittle. Seldom are such manuscripts read in their entirety. Quickly it becomes apparent that the proud author's manuscript is in need of far more changes than jots, tittles and iotas. More often an eager author will demand that his masterpiece be published then and there. If the manuscript be outstanding, long suffering will prompt the editor to seek to pursuade the impatient author to realize that the next issue already has gone to press and the duoproximo issue already lies in galley form on the publisher's desk. If such author is not amenable to such pursuasions, neatly he has already written his own letter of rejection.

The most difficult of authors as a type is

that one who, for example, may have administered some "believed to be" miraculous new drug to 18 patients with pleuritis leading to astonishing recovery. This physician, turned investigator, in his petty study provides no control subjects and fails to grasp that without any medication his patients might have recovered just as speedily or more so. Quickly there comes into hand a specious manuscript, aided and abetted by the drug manufacturer well convinced of the author's infallibility.

Deserving of more consideration is that manuscript from some overseas author who in deference to the language of this country undertakes to write in English. The editor barely is able to determine that what is before him is English. Often the scientific content is of high order. Rejection is out of the question, so there arises the fretting task of translating English into English. In time even that is accomplished and in further time the far removed author preens himself over his advancement in the English language.

None of these types of authors and manuscripts is a stranger on this assembly line of 1,000 manuscripts. Quickly it will become known why all editors are curmudgeons, quarreling with all proofreaders and disposed to develop some rare disease such as syringomyelia.

This is a report only on the first thousand manuscripts. When later the second thousand will have been processed, another report will be made. By that time perchance or through some miracle the perfect manuscript may have graced the mails.

Misoneism

Two professors strolling to their offices trod upon the struggling grass, skirting the "Please" sign, when the regular concrete walk was only 30 feet away. Pure heedlessness. The student in statistics, demonstrating to his fellow students the solution to an intricate problem, used the newly painted hall wall as his blackboard. Pure infantilism. Unseen miscreants destroyed the neat rows of blooming geraniums that decorated the side walls to the entry steps of a public building. Pure vandalism. The university provides learned courses on air pollution and smoke abatement, yet that university itself daily pours tons of reek into the atmosphere. Pure irresponsibility. Two women auto drivers meeting each other on a narrow street, blocked all protesting traffic for five minutes while they engaged in screaming, inane gabbling. Pure inconsideration. The young instructor met his class attired in a manner scarcely fitting for a hog calling contest. Pure pridelessness. One head of a department adamantly demanded that his staff assemble for a conference at exactly 8:30 in the morning but he was 40 minutes late, explaining only that his coffee percolator blew a fuse. Pure selfishness. One husband waiting in his car in front of a hospital for his tardy wife impatiently leaned for many minutes upon his auto horn at its topmost decibel level to the annoyance of some 900 hospital patients. Pure "cussedness." One library reader surreptitiously removed a current copy of a medical journal. On its equally surreptitious return, it was found that the article of presumed concern to the reader neatly had been cut out, thereby ruining that journal for binding purposes and thereby depriving all other would be readers of the opportunity for their own reading. Pure thievery.

Such minor affronts go on in endless variation, day by day. Perhaps all such is normal and to be expected in some detestable and despicable new order of affairs. Perhaps positive values are to be attached to calculated and uncalculated discourtesies. Protestation of this ugliness may mark the protestor only as a victim of misoneism — disrespect for any change in the old order of things. There may be good grounds for resistance of regimentation of people, but there are no grounds for the lack of regimentation of one's deeds, habits, behavior and conduct to the point that the only fitting word becomes "undisciplined." If strange changes in the acceptable order of things mark "misoneism" as an evil to be shunned, then that fact marks "misoneism" as a virtue to be pursued.

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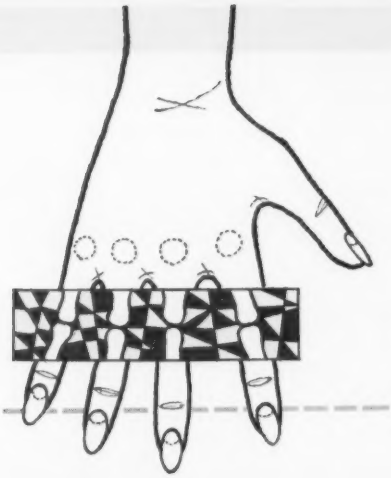

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COMMENT AND OPINION

A Blubber

Twenty-four striking longshoremen in Newcastle, England, insist they won't return to work until showers are installed on the docks. The stevedores, who spend eight hours daily handling highly redolent whale meat, complain they've been ordered off city buses. —*Industrial Relations News*, June 18, 1960.

Employ the Handicapped

Postmaster General Arthur E. Summerfield authorized on August 28 the sale of the new 4-cent "Employ The Handicapped" commemorative stamp. It pictures a man confined to a wheelchair capably operating a drill press. The central design was adopted from a photograph by Carl Bobertz, New York artist.

Issuance of this stamp coincided with the 8th World Congress of the International Society for the Welfare of Cripples, which was held in New York City under the sponsorship of The President's Committee on Employment of the Physically Handicapped. This Committee was authorized by Act of Congress ". . . to enlist the cooperation of public and private groups in a year-round program to promote employment of physically handicapped workers."

Disability Study

Investigators at the University of Michigan School of Public Health are launching a three-year study of California's state disability insurance program, in cooperation with the California State Department of Employment Security in Sacramento.

California, New York, New Jersey and Rhode Island are the only states in the nation which provide a statewide disability insurance program. Over 3½ million Californians contribute up to $36 each, per year, for this protection.

In the first stage of the study, specialists in public health economics will examine the worker's problems when his disability payments are discontinued after 26 weeks, the maximum coverage period. They will explore the type of medical care he receives during disability, the source of supplementary aid and the level of employment to which he returns. This phase of the work will be sponsored by a grant of $22,425 from the Office of Vocational Rehabilitation in the U. S. Department of Health, Education and Welfare.

The second phase, scheduled to begin in September, will make an over-all study of California's disability insurance program with particular attention to fiscal policies, medical features and administration. Evidence will be sought on the relationship between the disability program and benefits from Workmen's Compensation, hospital insurance and the disability provisions of Federal Old Age and Survivor's Insurance. This three-year project will cost about $200,000 and will be supported by the National Institutes of Health.

Both studies are being conducted by the Bureau of Public Health Economics at The University of Michigan. Dr. Nathan Sinai (Dr.P.H.) is Chief Investigator and S. J. Axelrod, M.D. is Director of the University of Michigan Bureau. Sinai will conduct field investigations in California.

Sports Medicine

While the world's greatest athletes are competing in the Olympics in Rome, Italy, physicians and scientists from other fields are holding an international conference to study the problems of a relatively new field — sports medicine. The scientists are gathered at the University of Rome's Institute of Human Anatomy for a program on "Health and Fitness in the Modern World," Aug. 29 through Sept. 9, 1960. Many of the physicians attending the conference are the head team doctors for their country's Olympic competitors.

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Medical Director: 35; past 2½ yrs, Med Dir, co. of 2500 emplys; seeks dirshp, Prev Med or Safety hlth program; prefers East, So., SE, SW, or West coast.

Medical Director: Fellow, Indus Med Ass'n; previous work in Surg & toxicology; presently, staff phy of lead'g co; now seeks med dirshp indus med; age 37.

Director of Aviation Medicine: Cert'd, Prev Med; MPH, Johns Hopkins Univ; trng includes 1½ yrs, ortho res; 10 yrs, Dir of Prof Services & Avia Med, USAF; now retiring from mil serv; will accept foreign or domestic post.

Internist: MPH, Columbia; 2½ yrs, Clinician hlth ofc, U. S. overseas mission; 2 yrs, city hlth ofc; seeks med dirshp or assoc dir w/ clinical duties in Int Med in a comprehensive prepaid med care program—prefer labor med; seeks East; late 30's.

Staff Physician: 35; post-grad work—aviation med & atomic-biological-chemical defense; 1 yr, priv pract & 1 yr indus wk; seeks area west of Rocky Mtns.

Staff Physician: A.B., Northern Univ; three years, private general practice; prefers Indus position; West or Northwest; Age 33.

Staff Physician: Career post, lead'g to med dirshp; 10 yrs, private, general pract including 7 yrs as Med examiner, lge electric mfgr co; capable genl & ortho surg; any locality; early 40's.

Staff Physician: Seeks primarily foreign appt, will consider others; 2 yrs, priv pract; 4 yrs, indus med; age 34.

Staff Physician: MPH, Univ. of Mich; M.D., Colo; 1 yr, post-grad, Indus hlth, Harvard; 6 yrs, Indus phys, important oil co; seeks full-time indus hlth wk—dir active med, Indus hygiene & safety progm; Kansas City area; age 36.

Staff Physician: 7 yrs, owned & oper'd 50 bd hsp; wishes change in med career; seeks Indus post combining med abil w/adm, counseling or clin rsrch; prefers SW or MW, but will locate anywhere; Age 35.

POSITIONS OPEN

Medical Director: (a) Internist; well-trnd; full-time; important co, leader in its field; also oppor med schl tchg; shld have good adm exper; personable; lge city, E. (b) Med Dir; eastern co; $15-18,000 start; age to 50 years; prefer RR or Air experience.

Assistant Medical Director: (c) Maintain lab & sml dispensary, 800 ofc emplys; bus, estab'd 51 yrs; 40-hr, 5 day wk; excl fringe benefits; career oppor; Central. (d) Shld be Diplomate, Prev Med; lge co with regional plants; $18-22,000; W. coast.

Staff Physicians: (e) Plant, 4,000 emplys; man or woman; hours 8:40-4:30, 5 day week; $12,000 or more; nr New York city. (f) Bd internist assn w/6 Bd men; executive hlth progm; excel lab; world hdqtr ofc, lge co; tchg, rsrch permitted; NYC.

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The purpose of the conference is to promote and advance scientific studies dealing with the effect of sports, motor activities, environmental influences, and training procedures on the health of human beings. The scientists are attempting to set up a system to improve worldwide interchange of knowledge in the field.

"Scientists in the field of sports medicine have only recently begun to communicate adequately their knowledge to one another," observes Prof. Leonard A. Larson, University of Wisconsin Department of Physical Education for Men, who developed the program for the Rome conference.

"In these times, young men and women throughout the world are encouraged to participate in sports and vigorous activity. Daily physical activity is indeed an essential part of preparing for a life of good health. However, it is often questionable whether a particular person should participate in a particular sport, because of physical abnormalities and other inadequacies which science cannot yet isolate completely.

"There are many disciplines tied into the study of sports medicine. Physicians, physical and biological scientists, physical education specialists, psychologists, and others all have an interest in the field of sports medicine. This makes it all the more imperative that scientists communicate their findings to each other."

Among the physicians attending the conference are Joseph B. Wolffe, M.D., head of the Wolffe Heart Clinic, Philadelphia, and R. T. Clark, M.D., head of the Aero-Medical Research Center, Oklahoma City. They are considering the effects of long-term exercise on aging, the ascertainment of physical capacity, fundamental characteristics of the nervous system in athletes, measurement of human reactions during training, and the physiological influences of emotions on physical efficiency.

Americans are not restrained from participating in competitive sports by the danger of sprains, strains, and contusions, it is reported by statisticians of the Metropolitan Life Insurance Company.

No precise figures are available on the number of Americans engaging in sports annually, but the statisticians estimate that several million participate in sports involving some element of danger, such as football, baseball, boxing, basketball, skiing, and ice hockey. Information from various sources indicates that injuries resulting in temporary disability are quite common in organized competitive sports and that the annual toll includes many severely injured and not a few deaths.

Football accounted for 108 deaths in the United States during the five-year period 1955-59, according to figures compiled by the American Football Coaches Association. Of this total, 81 sustained their injuries in activities directly associated with the game, such as tackling and blocking; tackling was responsible for more than one-fourth of the fatalities directly

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connected with the game. The 27 deaths indirectly attributable to football were caused by heat stroke, heart failure, and other conditions.

The danger of fatal injury in baseball is relatively small. In the major leagues, which include more than 400 players, there has not been a fatal injury since 1920. In the last five years there were relatively few fatal injuries among amateur players, although more than two million boys participate on scholastic teams, in the Little League, American Legion Junior, and similar organizations.

Boxing took the lives of at least 12 amateur fighters and six professionals in the 1955-59 period. Most of these fatalities resulted in mishaps in actual bouts; very few occurred in training. A disturbing factor is the increase in deaths among amateur boxers, five lives being lost in 1959 alone.

Nuclear Accidents

A Government agency and labor leaders disagree about industrial nuclear installations as a potential public hazard. The Atomic Energy Commission, has taken the position that "the probability of reactor accidents having major effects on the public ranged from a chance of one in 100,000 to one in 1,000,000,000 per year for every large reactor."

The position of the American Federation of Labor-Congress of Industrial Organizations is that the commission tends to "minimize" the danger and thus weakens efforts to prevent accidents.

In testimony before the Joint Committee on Atomic Energy, a spokesman for the A.F.L.-C.I.O. said the commission, "in our judgment, has not taken adequate steps to meet the radiation hazard problems which we know continue to be serious." The A.F.L.-C.I.O. charged the commission with neglect in this area and accused it of withholding "the full truth" of the dangers resulting from accidents that have occurred.

Referring to a serious radiation accident at Oak Ridge, Tenn., which Atomic Energy Commission officials had described as "small," Walter P. Reuther, President of the United Automobile Workers, A.F.L.-C.I.O., wrote to Arthur S. Flemming, Secretary of Health, Education and Welfare and chairman of the Federal Radiation Council, as follows:

"Efforts to seek information in order to help develop policy to prevent the repetition of this type of accident revealed the fact that neither the Congress nor the agencies affiliated to the Federal Radiation Council had been advised of the seriousness of this accident nor of the steps necessary to prevent its repetition."

Forty American communities from 1945 to 1959 have been exposed to the danger resulting from substantial radiation released by a nuclear accident, according to the A.F.L.-C.I.O. The 40 accidents do not include those involving single individuals or those military in nature.

In April there was an accident at the Oak Ridge Nation-

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al Laboratory. According to the most recent Atomic Energy Commission report, more than 100 persons were exposed to radiation from the incident. The radioactive material was spread through the installation by the air-conditioning system.

Decontamination is not yet complete and costs of cleaning work are estimated at about $39,500. As a result of another accident two years ago, suit has been filed by eight workers who suffered exposure to released radiation. The eight are seeking almost $1,000,000 for health damages.

Labor's contention is that accidents like these might have been prevented if the Atomic Energy Commission had adequately and openly analyzed the facts and factors involved in previous accidents rather than having minimized their extent and number.

Scientific medical opinion is that since such accidents are inherent in the development of atomic energy and weapons, there should be a program aimed at prevention and more and better training and planning among physicians and nurses to enable them to cope with such disasters.

Labor says it is not opposed to the industrial development of nuclear power. On the contrary, it is on record as favoring a greater emphasis on peaceful uses of the atom, but with standards that offer the utmost in safety for both the worker and the public.

—From *The New York Times*, July 17, 1960.

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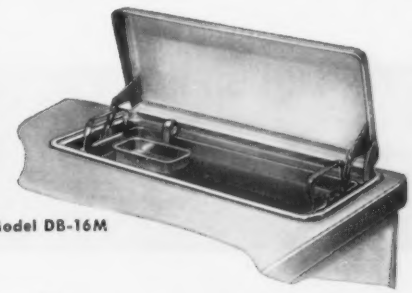

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Safe Sailing

Surgeon General Leroy E. Burney of the Public Health Service has announced that the Special Citation of the Service has been awarded to the American Export Lines, Inc., and the Luckenbach Steamship Company, both of New York City, for excellence of vessel sanitation during the past five years.

Dr. Burney presented the citations on August 5, in his office. A number of Federal, shipping industry, and maritime labor officials were present. Admiral John M. Will, President of American Export Lines, and James Sinclair, President and General Manager of Luckenbach, accepted the awards.

The Special Citation recognizes the efforts of each company in bringing its ships to a score of "excellent" during an official PHS environmental health survey which covers the 166 separate items directly related to protection of health of passengers and crew. The award is granted yearly, but this is the first time that any shipping company has

won the citation five consecutive times. Dr. Burney said the achievement represents to a great extent the industry-government cooperation which has been built up since the award program was established in 1955.

The American Export Lines, Inc., operates five passenger ships, the SS Independence, Constitution, Atlantic, Excalibur and Exeter, plus a number of passenger-cargo vessels. The Luckenbach Company operates a number of cargo ships with limited passenger accommodations.

Ontario Reports

Explosions and contact with electrical current rule as the most costly injury-factors in Ontario industry.

Among 1959 compensation cases settled by Workmen's Compensation Board, electrical contact cases averaged out at $2,469 per claim to top the injury types.

Explosions, averaging $2,989 for each claim, led the group of "agencies" causing injury.

The board's 1959 annual report also shows:

Of a labor force of 1.8 million covered for compensation purposes, about one person in every seven had some type of accident requiring medical treatment only.

About one in 25 was compensated for more than four days' disability and one in 700 had a claim settled for permanent disability.

Of settled compensation cases, 92.8% were injuries to men although women represented about 27% of the employed labor force during the year.

Total costs of settled cases was $42 million for an average per claim cost of $584.

Permanent disability cases remained at 3.62% of all settled claims, as in the previous year. Number of injured workers who were successfully rehabilitated rose to a new high.

More injuries occurred to hands and fingers of workers than to any other parts of the body. Sprains and strains were the most common injury.

—From *The Financial Post*, Toronto, Canada, July 9, 1960.

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Flu Weather

Can a change in the weather cause an epidemic of the flu? Dr. K. H. Kingdon of the General Electric Research Laboratory has found evidence that it may have a powerful influence. In a recent article in *The American Review of Respiratory Diseases* he gives a theory which links relative humidity and the spread of respiratory diseases on the basis of known physical and chemical factors. Statistics on the Asian flu epidemic of 1957 support the idea.

Dr. Kingdon's theory relates the spread of infection to the effect of humidity on thousands of tiny water droplets expelled during a sneeze. When the humidity is high, the droplets do not evaporate, so they remain relatively large and settle out of the atmosphere fairly quickly. When the humidity is somewhat lower than about 85%, chemical factors resulting from rapid evaporation combine to kill or weaken the virus. In an intermediate humidity range, from about 85 to 95%, the droplets

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1. Grayzel, H. G., and Schapiro, S.: Western J. Surgery, Obstet. & Gyn., Oct. 1956.

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1. Gordon, E. E. and Haas, A.: Industrial Medicine & Surgery 28:217, 1959.

are small enough to remain airborne for a long time and chemical conditions are most favorable for the virus.

Statistics from several large cities on the Asian flu epidemic of 1957 show that large scale epidemics did not break out as soon as the virus was widespread, but came several months later following periods in which the relative humidity had often been in the 85 to 95% range. This suggests that the most favorable humidity conditions may be necessary before a respiratory infection can spread rapidly enough to reach epidemic proportions. If further studies should prove the theory correct, it may prove helpful in controlling epidemics of flu, colds and other respiratory infections through control of humidity in schools, industrial plants, and other public places.

Dr. Kingdon, who is a physicist, became interested in air-borne infections through studies he has made on air conditioning for the General Electric Company.

Get Your Shot

Leroy E. Burney, M.D., Surgeon General of the Public Health Service, has issued an urgent plea to the American people to speed up polio vaccinations.

Noting that of the 310 paralytic cases on which the Service has received reports of vaccination status so far this year, 166 had had no vaccine, Dr. Burney said, "With an effectiveness of 90% or better when the basic 3 doses and the booster have been received, most of these cases could have been prevented."

Dr. Burney has reported the following figures for the approximate midpoint of the polio year: In the first 30 weeks of 1960, states reported 610 paralytic cases compared to 1,338 cases for the same period of 1959. In 8 states and the District of Columbia, no paralytic cases have been reported this year and in 31 other states the number has been lower than a year ago.

Only three states have reported marked increases over 1959: Rhode Island, with 59 paralytic cases as of July 30 compared to two last year; California, with 152 paralytic cases compared to 120 last year; and South Carolina, with 29 paralytic cases compared to 11 last year.

It is estimated that persons who have as yet had no vaccine include 14% of those under 20 years of age, 45% of those 20 to 40 years of age, and 89% of those over 40 years of age.

"Inevitably, polio will take its heaviest toll among the unvaccinated," Dr. Burney said. "Since the paralyzing effects of the disease are usually most severe among older persons, it is important that they be vaccinated."

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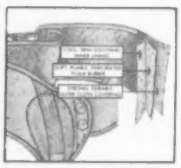

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Lichtman[1,2] used Trancopal to treat patients with low back pain, stiff neck, bursitis, rheumatoid arthritis, osteoarthritis, trauma, and postoperative muscle spasm. He noted that Trancopal produced satisfactory relief in 817 of 879 patients (excellent results in 268, good in 448 and fair in 101).

Gruenberg[3] prescribed Trancopal for 70 patients with low back pain and observed that it brought marked improvement to all. "In addition to relieving spasm and pain, with subsequent improvement in movement and function, Trancopal reduced restlessness and irritability in a number of patients."[3] In another series, Kearney[4] reported that Trancopal produced relief in 181 of 193 patients suffering from low back pain and other forms of musculoskeletal spasm.

Trancopal enables the anxious patient to work or play. According to Gruenberg, "In addition to relieving muscle spasm in a variety of musculoskeletal and neurologic conditions, Trancopal also exerts a marked tranquilizing action in anxiety and tension states."[3] Kearney[4] found "... that Trancopal is the most effective oral skeletal muscle relaxant and mild tranquilizer currently available."

Side effects are rare and mild. "Trancopal is exceptionally safe for clinical use."[3] In the 70 patients with low back pain treated by Gruenberg,[3] the only side effect noted was mild nausea which occurred in 2 patients. In Lichtman's group, "No patient discontinued chlormethazanone [Trancopal] because of intolerance."[1]

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References: 1. Lichtman, A. L.: *Kentucky Acad. Gen. Pract. J.* 4:28, Oct., 1958. 2. Lichtman, A. L.: Scientific Exhibit, Internat. Coll. Surgeons, Miami Beach, Fla., Jan. 4-7, 1959. 3. Gruenberg, Friedrich: *Current Therap. Res.* 2:1, Jan., 1960. 4. Kearney, R. D.: *Current Therap. Res.* 2:127, April. 1960.

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TRANCOPAL (BRAND OF CHLORMEZANONE) AND CAPLETS, TRADEMARKS REG. U. S. PAT. OFF.

1500M

Proven

in over five years of clinical use and
more than 750 published clinical studies

Effective

for relief of anxiety and tension

Outstandingly Safe

- simple dosage schedule produces rapid, reliable tranquilization without unpredictable excitation
- no cumulative effects, thus no need for difficult dosage readjustments
- does not produce ataxia, change in appetite or libido
- does not produce depression, Parkinson-like symptoms, jaundice or agranulocytosis
- does not impair mental efficiency or normal behavior

Miltown®

meprobamate (Wallace)

Usual dosage: One or two 400 mg. tablets t.i.d.
Supplied: 400 mg. scored tablets, 200 mg. sugar-coated tablets; or as MEPROTABS®—400 mg. *unmarked*, coated tablets.

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